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* Resigned October 10, 1905.

† Elected November 14, 1905.

ERRATA, VOLUME 5

Page 11, 12th and 13th lines from the bottom, *for* only one embryo-sac in each ovule *read* only one egg-apparatus in the embryo-sac.

Page 110, in title and 9th line from bottom, for *Stigeocloneum*, read *Stigeoclonium*.

Page 111, 2d line, for *Stigeocloneum*, read *Stigeoclonium*.

Page 119, 5th line from bottom, for *Myrmicocystis* read *Myrmecocystus*.

Page 120, 4th line from bottom, for *pruniasus* read *pruniosus*.

Page 121, 12th line, for *Coxinella* read *Coccinella*.

Page 196, 7th line, *for* 2,000, *read* 2,500.

Page 205, 2d line, *for* J. N. Painter, *read* J. H. Painter.

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January, 1905

DISCONTINUOUS VARIATION AND THE ORIGIN OF SPECIES*

BY D. T. MACDOUGAL

That distinct and separate qualities expressed in recognizable external characters may appear suddenly, or disappear completely, in a series of generations of plants, has been a matter of common observation so long that it would be difficult to hunt out and fix upon the first instance of record.

The significance of such phenomena was obviously beyond the comprehension of the earlier botanists and it is evident that a rational recognition of the phylogenetic value of sports and anomalies necessarily awaited the development and realization of the conceptions of unit-characters of the minute structures which are the ultimate bearers of heredity, and of the inter-dependence of the two in such manner as to constitute actual entities as embodied in Darwin's pangenesis, de Vries' intra-cellular pangenesis and in Mendel's investigations upon heredity. It is equally apparent that a proper interpretation of the facts in question, and their distinction from the results of hybridization was possible only by means of the analysis of the collated results of observations upon series of securely guarded pedigree-cultures, in which the derivation of all of the individuals of several successive generations had been noted. For it is now thoroughly realized that the main questions of descent and heredity and of evolution in general are essentially physiological, and as such their solution is to be sought in experiences with living organisms and not by deductions from illusory "prima facie" evidence, which has been so much in vogue in evolutionary polemics, nor

* Address delivered by invitation before the American Society of Naturalists at Philadelphia, December 28, 1904.

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by "interpretations of the face of nature" with the accompanying inexact methods and superficial considerations. It was upon the safe basis of the first-named conceptions, and by means of the methods entailed that de Vries has so successfully grappled with the problems involved in the investigation of the part played by discontinuous variation in evolution.

In view of the amount of orderly and well-authenticated evidence now at hand, it may be assumed as demonstrated that characters and groups of characters of appreciable physiological value, originate, appear in new combinations, or become latent, in hereditary series of organisms in such manner as to constitute distinct breaks in descent.

This is the main thesis of the mutation theory: the saltatory movements of characters, regardless of the taxonomic value of the resultant forms. That the derivatives might be considered as species by one systematist, and varieties by another is quite incidental and of very little importance. The main contention lies in the claim that characters of a definite nature appear, and become inactive suddenly, and do not always need thousands of years for their infinitely slow external realization, or for their gradual disappearance from a strain.

Of course the principal corollary of the mutation-theory is that the saltations in question do result in the constitution of new species and varieties. As a matter of interest it may be stated that all of the systematists who have seriously examined the adult mutants of the evening-primroses cultivated in the New York Botanical Garden have held the opinion that certain ones were to be considered as species and others as varieties.

Furthermore, these conclusions are confirmed when the characters of the mutants are subjected to statistical methods of investigation. In the observations of Dr. Shull, which will be presented more fully before the Botanical Society of America, it has been found that qualities of the mutants, susceptible of measurement, depart definitely and clearly from the parental type and fluctuate about a new mean, and do not intergrade with the parental form. The amplitude of fluctuation about the new center is greater than that of correspondent parental qualities,

and the degree of correlation is much less in the mutants than in the parent. This is seen by inspection to be true in one species during the first year of its existence, and is confirmed by the exact observations on other forms a dozen years after their mutative origin. Consequently the features in question may not be taken to be in any way the result of selection but are in themselves new qualities.

Lamarck's evening-primrose offers such striking and easily recognizable examples of discontinuous variation, and has been the object of so much detailed study that we are in danger of giving way to the supposition that the mutation-theory rests upon the facts obtained from this plant alone. It is to be said, however, that if it and all of its derivatives were destroyed, the results of experimental studies which have been made upon mutations in other species, upon the behavior of retrograde and ever-sporting varieties, the occurrence of systematic atavism, and of taxonomic anomalies, pelories and other morphological features would furnish ample support for the conception of unit-characters, and serve to establish the fact that mutations have occurred in a number of species representing diverse groups.

It is now becoming plainly apparent that the phenomena of hybridization, by the opportunities afforded for the study of the included unit-characters in a segregated condition, for the analysis of complex characters, and of the various principles governing the transmission, activity, dominancy, latency and recessivity of characters, promise to yield results of the first magnitude concerning the mechanism of descent and heredity. The possibilities of crosses between species comparatively widely different in morphological and physiological constitution among plants indicate that the ultimate generalizations upon hybridism will find broader exemplification in plants than in animals.

It is pertinent to point out in this connection that the unguarded use of the terms "variation" and "mutation" to designate phenomena of segregation and alternative inheritance when races or species are thrown together in a hybrid strain is bound to result in much confusion, especially in dealing with plants, since it is well known that direct mutants of either parent occasionally occur in such mixed strains.

From this last consideration we pass naturally to a discussion of the nature of the material which may be of use in the study of fluctuating and discontinuous variability. It needs no argument to support the assertion that a successful experimental analysis of the behavior of separate characters may be carried out only when dealing with series of organisms fluctuating about a known mean with a measurable amplitude of variability.

Systematic species as ordinarily accepted generally consist of more than one independent and constant sub-species, or elementary species which may not be assumed to interbreed or intergrade, unless actually demonstrated to do so by pedigreed cultures. So far, but few elementary species have been found to interbreed. A due recognition of this simple fact would save us a vast amount of pyramidal logic resting on an inverted apex of supposition.

Again the accumulation of observations upon the prevalence and effect of self- and cross-fertilization has totally unsettled the generalizations current within the last few decades. Briefly stated, a moderate proportion of the flora of any region is autogamous, a large proportion both autogamous and heterogamous, and a moderate proportion entirely heterogamous. The relative number of species included in the categories indicated varies greatly in different regions. To assert the deleterious effects of self-fertilization, of all or a majority of plants, is to base a statement upon evidence that lacks authentication and correlation, as has been strikingly demonstrated by recent results. As a matter of fact no phase of evolutionary science is as badly in need of investigation as that which concerns the effects of close and cross-breeding.

It is also to be said that current misconceptions as to the extreme range of fluctuating variability of many native species have arisen from a failure to recognize the composite nature of the Linnaean, or group-species, upon which observations have been based, as I have found with the common evening-primrose.

The demands of ordinary floristic work are usually met by the formulation of collective species, which are in fact, an undeniable convenience, and necessity perhaps, for the elementary teacher and

the amateur. Upon the specialist in any subject rests the obligation to furnish his non-technically trained constituency with conceptions of the facts and principles within the domain of his investigations, which will be inclusive, and easy of comprehension. But if in accordance with this requirement, the systematist contents himself with this looser, and with due regard it may be said, more superficial treatment, and does not delineate clearly the elementary constituents of a flora, or falters in carrying his analysis of relationships to its logical end, he fails notably in the more serious purpose of his investigations, and his work must be supplemented and extended before it becomes an actual basic contribution to the physiologic or phylogenetic branches of the science. To study the behavior of characters we must have them in their simplest combinations. To investigate the origin and activity of species we must have them singly and uncomplicated.

Lastly, we may turn to a phase of the subject which has, as yet, received nothing but speculative consideration — that of the causes which induce the organization of new characters and which stimulate their external appearance. The recurrence of the known mutants of Lamarck's evening-primrose, and the occurrence of new mutants of other species has taken place in New York and Amsterdam under conditions that lead to the definite conclusion that a favorable environment including the most advantageous conditions for vegetative development and seed-production facilitates the activation and appearance of latent qualities; and the inference lies near at hand that such conditions also facilitate the original organization of new unit-characters or changes in these entities. We conclude therefore that favorable environment promotes the formation of new species as suggested by Korshinsky, and that new species do not arise under the stress of infra-optimal intensities of external factors as proposed by Darwin.

Furthermore it has been found that certain qualities arise and disappear more numerously, and presumably more readily than others in a mutating strain. Thus, those embodied in the mutants *Onagra* (*Oenothera*) *oblonga*, and *nanella* find external reali-

zation in many more individuals than those which constitute the differentiating features in *rubrinervis*, *scintillans*, *gigas*, *elliptica*, *subovata*, and others.

Again the inspection of the cultures made in Amsterdam and New York demonstrates that the last-named locality offers more favorable soil and climate for the evening-primroses. Correlated with this I am able to report that careful attention to the cultures has resulted in an increase of the proportion of mutants from the five per cent. maximum of de Vries to more than six per cent. in the last season, in the American cultures, and to say that some forms which did not reach maturity, and others which did not occur, in Amsterdam, may find in New York a climate in which they carry out their entire development. The cultures of Lamarck's evening-primrose now being carried on include 14 recognizable mutants, and it is pertinent to state that I have mutants of other species which will be duly described after they have completed a cycle of development.

All components of the environment may not be taken to be of equal value in the induction of new qualities, and I by no means wish to give the impression that the problem is on the point of being solved, but our hopes have been raised to the highest pitch that we may soon be able to discern the factors more or less directly concerned.

To be able to bring the causes operative in the formation and structural expression of qualities, that is, the moving forces of evolution, within the range of experimental investigation would be a triumph worthy the best effort of the naturalist; in that it would give us the power to give new positions to qualities and thus produce new organisms, its importance would rank well with that of any biological achievement of the last half century.

New York Botanical Garden.

A PASPALUM NEW TO THE WEST INDIES

By George V. Nash

In working over some grass material secured by Mr. A. H. Curtiss (no. 379) on the Isle of Pines, just to the south of Cuba,

an interesting species of the genus *Paspalum* was encountered. It was impossible to correlate this with any of the known species of the West Indies, and a search among the South American forms revealed several specimens of a species from Brazil, the *Paspalum lineare* of Trinius. One of these specimens is no. 763 of Mr. Spencer Moore, who secured it in the Matto Grosso region. It was upon this number that Mr. Moore founded his *Panicum furcellatum* (Trans. Linn. Soc. II. **4**: 505. *pl. 34. f. 14–22*), and I am at a loss to understand why the grass was described as a *Panicum*, for it has all of the characters of a *Paspalum*, as now understood,— a secund inflorescence and a spikelet of three scales — unless it be the occasional presence of a small fourth scale, an occurrence not uncommon in *Paspalum*. The specimen of Moore's 763, referred to above, which is in the herbarium of Columbia University, has but one or two of the spikelets with a fourth scale, the remainder possessing but three scales. Mr. Moore remarks that his species is "treacherously like *Paspalum tropicum* Doell and *P. Neesii* Kth.," and if Mr. Moore considers *Paspalum Neesii* Kth. synonymous with *P. lineare* Trin., I must consider the resemblance most treacherous, for I cannot distinguish the grasses.

Mr. Moore's plant came from Santa Cruz, better known in that region as Barra dos Bugres, a small town about one hundred miles to the northwest of Cuyabá. The specimen upon which *Paspalum lineare* was based was said by its author, Trinius, to have been secured by Langsdorff in Brazil, but no more definite location was given. In 1825, the Langsdorff expedition, of which Riedel was botanist, passed through the Matto Grosso region. Langsdorff and Riedel journeyed together as far as Cuyabá, where they separated, the latter proceeding eastward, while the former went to the northward, along the Arinos and Tapajos rivers. This course would have carried Langsdorff within a few miles of Santa Cruz, at which place Mr. Spencer Moore, sixty-seven years later, secured the material upon which he based his *Panicum furcellatum*.

A word as to the rather complicated history of the names which have been applied to this plant may not be out of place.

Trinius in 1826 (Gram. Pan. 99) published two species of *Paspalum*. The first of these appears as follows: "*Paspalum angustifolium* N. ab Es.! in Mart. Fl. Bras. ined." He remarks that it is similar to the following species, *P. lineare*, but differs especially in the smaller rugose spikelets; and remarks further that the name must be changed on account of the earlier name of Le Conte. In 1828, Trinius (Sp. Gram. Ic. 111) figures and again describes his *Paspalum lineare*, and cites, as of doubtful synonymy, the *P. angustifolium* N. ab Es. of his own publication (Gram. Pan. 99), adding in a footnote that what he had received previously under this name from Nees himself appears to be a different species on account of the much smaller spikelets which are subrotund-oblong, transversely rugose and without hairs at the base. The plate accompanying this description bears the name *Paspalum angustifolium*. In 1829 Nees (Fl. Bras. Enum. 64) published a *Paspalum angustifolium* which, judging from the description, is identical with the *Paspalum lineare* of Trinius, published three years previously, and indeed he makes the following citation: "*Paspalum lineare* Trin. ined." At the same time he publishes a variety β, characterizing it thus: "glumis transversim undulatis." As this rugose character of the spikelet was employed by Trinius in his publication of *P. angustifolium* to distinguish it from his *P. lineare*, Nees, by his procedure, attempted exactly to reverse the order of things. But whether Trinius was right or wrong in interpreting Nees really is of little consequence, for priority requires that we take up the species as characterized by Trinius in 1826; so the *Paspalum angustifolium* Nees (Fl. Bras. Enum. 64) becomes synonymous with *P. lineare* Trin., and the variety β must be considered the same as the *P. angustifolium* Nees (Trin. Gram. Pan. 99). In 1829 Kunth (Rev. Gram. 1: 25), probably aware that the name *angustifolium* was antedated by that of Le Conte, proposed another name for the species in the following manner: "*Paspalum Neesii.* (*Paspalum angustifolium* Nees ab Esenb.) Brasilia." He does not designate whether he meant the name published by Trinius for Nees or that published by Nees himself, so the former must be understood.

In the Index Kewensis the three names under discussion are

considered synonymous, and the two former, *P. angustifolium* and *P. lineare*, published in 1826, are referred to the *P. Neesii* Kunth, described in 1829, a rather queer procedure, where the rule is that the oldest binomial shall be taken up, for certainly, if it is necessary to unite *P. angustifolium* and *P. lineare*, the former being invalidated by the earlier publication of Le Conte's name, *P. lineare* is available.

NEW YORK BOTANICAL GARDEN.

ONAGRA GRANDIFLORA (AIT.)* A SPECIES TO BE INCLUDED IN THE NORTH AMERICAN FLORA

BY ANNA MURRAY VAIL

In searching through several herbaria for specimens of *Onagra Lamarckiana* that had grown wild in North America, it became apparent that there was a large-flowered evening-primrose which, though closely related to *O. Lamarckiana*, could not be referred to that plant as it is known in Europe in the wild state and in cultivation.

The reference by Bartram † to a large-flowered evening-primrose seen near Tensaw, Alabama, suggested the possibility of finding the plant still growing in the locality where he found it in August, 1776. Professor S. M. Tracy kindly undertook the search for it, and on August 16, 1904, he re-discovered the locality, and the plant, described so vividly by Bartram as "the most pompous and brilliant herbaceous plant yet known to exist."

Abundant material was sent to the New York Botanical Garden and extensive cultures of *O. grandiflora* have been begun, in an attempt to establish its relation with its allies. Further details will be included in an article now in press.

Oenothera grandiflora Ait. was based on a plant introduced from North America by John Fothergill in 1778. The plate

* **Onagra grandiflora** (Ait.) = *Oenothera grandiflora*, Ait. Hort. Kew. **2**: 2. 1789.

† Bartram, William. Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee Country, the extensive territories of the Muscogulges or Creek Confederacy, and the Country of the Chactaws. Dublin, 1793 (reprinted from the Philadelphia edition of 1791), p. 404.

cited after the description (L'Héritier, Stirp. Novae, 2, *pl. 2*) was never published, and repeated search for the original drawing or a copy of the unpublished plate has not been successful.

An herbarium specimen of "*Oenothera grandiflora* MSS. Ait. Hort. Kew **2** : 2" from "Hort. Fothergill 1778" is preserved in the Herbarium of the British Museum, and a traced drawing of this specimen was procured for the Garden by Dr. H. H. Rusby in August, 1904. A close comparison of the herbarium specimens of the Alabama plant collected by Tracy and the tracing of the Fothergill plant show them to be identical, and the evidence is fairly conclusive that the *Oenothera grandiflora* Ait., so well and so long established in cultivation, originated from seeds sent to Fothergill by William Bartram after his famous travels through the southern United States.

The Alabama plants were shown to Professor de Vries when he passed through New York in October, 1904, and he unhesitatingly stated that they did not in the least resemble the *Oenothera Lamarckiana* of his experiments.

Just what is the relationship of *Onagra grandiflora* (Ait.) from Alabama, with other large-flowered species in general cultivation, remains to be investigated. The historical records of *Onagra grandiflora* are numerous and most complicated, but it is of undoubted interest at the present time to find the plant spoken of by Bartram still growing in the same locality observed by him more than a century and a quarter ago, and to find it still true in every way to the characters as described by him at the time,' and which are now still further emphasized by the tracing of the plant grown by Fothergill in 1778.

NEW YORK BOTANICAL GARDEN.

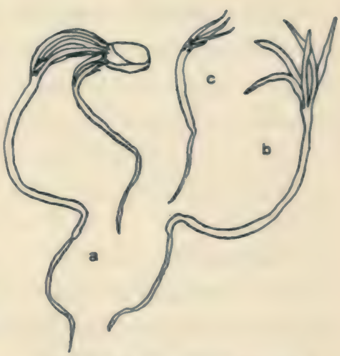
SHORTER NOTES

Carex Underwoodii sp. nov.— Stout, glabrous; culm sharply trigonous, 1 m. high or more, roughish above. Leaves about as long as the culm, 1–2 cm. wide, slightly rough-margined: spikes clustered at the summit, the pistillate 4, linear-cylindric, 4–5 cm. long, about 8 mm. in diameter, the lowest on a slender stalk about 2 cm. long, the others sessile or nearly so: staminate

spike 1, very nearly sessile, 4 cm. long, 4 mm. thick: perigynia a little inflated, 5 mm. long, narrowly ovoid, strongly several-ribbed on both sides, narrowed into a short beak, with 2 subulate nearly erect teeth about 1 mm. long; scales pale green, 3-nerved, a little shorter than the perigynia, ovate, ciliate-margined, tipped with an awn about 2 mm. long.

In *Sphagnum*, Salt Hill Marsh, Content Road to Cinchona, Jamaica, *L. M. Underwood*, January 29, 1903 (*no. 158*). Related to *C. hystricina* Muhl., but very much larger and broader-leaved, the perigynia less inflated, their beak shorter and its teeth longer. In Urban, Symb. Ant. **2**: 159, Mr. C. B. Clarke records the occurrence of *C. hystricina* at Salt Hill, Jamaica; I have not seen the specimen that he cites (Herb. Bot. Dept. Jam. 2081), but I suppose it represents the species here described, which is certainly distinct from the widely distributed plant of eastern North America. N. L. BRITTON.

TWIN PINE EMBRYOS. — Apart from polyembryony resulting from adventitious buds on the nucellus, as exhibited in *Citrus* and a few other genera, it would seem probable that a plant like the pine, which produces regularly several archegonia in its prothallus, would more often have several embryos in the same seed than would plants which produce normally only one embryo-sac in each ovule. But apparently twin or triplet embryos are very rare in the pine; my classes handle hundreds of pine seeds and seedlings each term, yet the twin embryos figured in the accompanying drawings are the only ones I have happened to see. It may be an instance of "having eyes and seeing not"; if so, will some one kindly enlighten me? IDA CLENDENIN.



TWIN EMBRYOS OF PINE

a, Embryos before cotyledons had entirely emerged from endosperm; *b*, larger embryo, with five cotyledons; *c*, smaller embryo, with three long and two short cotyledons.

BROOKLYN, N. Y.,
December, 27, 1904.

REVIEWS

Proceedings: International Conference on Plant Breeding and Hybridization*

An international conference on plant breeding and hybridization was held in New York City, September 30 and October 1 and 2, 1902, and the papers there presented, together with the discussion on them, have been collected and published by the Horticultural Society of New York as Memoirs, Vol. 1, under the editorship of the secretary of the society, Leonard Barron.

The programme of the meeting as given in the Memoirs was long as well as comprehensive. Thirty papers were read, thirteen additional were read by title, and all of these save one are given in the report of the conference.

Some idea of the scope of the work presented can be had if the titles of half a dozen papers, chosen at random, are given. Professor William Bateson, Cambridge, England, gave "Practical Aspects of the new Discoveries in Heredity"; Mr. W. A. Orton, U. S. Dept. of Agriculture, "On the Breeding of Disease-resistant Varieties"; Mr. L. C. Corbett, U. S. Dept. of Agriculture, "Improvement of Roses by Bud Selection"; Professor William Saunders, Director of the Central Experimental Farm, Ottawa, Canada, "Results of Hybridization and Plant Breeding in Canada", and, to cite but one additional title, M. P. de Vilmorin, Paris, France, "The everbearing Strawberry."

Naturally the work of the earlier hybridizer, Gregor Mendel, was repeatedly referred to and was the central idea of several papers, particularly those of Bateson and de Vries.

Professor Bateson presented his now well-known views on the nature of the sex cells, or gametes, and their relation to the segregation of inheritable characters. He showed, among other things, that hybrids with certain characters fixed arise by the union of equivalent gametes (equivalent as regards the character in question), to use his terminology such are homozygotes, and that, on the other hand, unstable hybrids are produced as a result of the union of gametes unlike as being bearers of the char-

* Proceedings International Conference on Plant Breeding and Hybridization. Memoirs Hort. Soc. New York, 1: 1–271. 1904.

acters in question, or such are heterozygotes. It appears to the reviewer that Professor Bateson's terminology is peculiarily fit, avoiding such circumlocution as "a hybrid with fixed character," meaning a homozygote, or "a hybrid with variable characters," meaning a heterozygote.

Professor Bateson speaks of two subjects, but does not discuss them at length, which are the theses of a paper by de Vries, "On artificial atavism," namely, the resolution of compound characters and the reformation of compound characters through the combination of simpler ones.

Without going into this interesting subject in detail, it can be said that Professor de Vries by beautiful experiments shows that characters apparently simple may be separated into more elemental ones, and conversely by the combination of the latter the compound character may be restored. In case the latter is an ancestral character the phraseology "artificial atavism" is well taken.

Generally speaking, the plant breeders had not taken advantage of the Mendelian theory in their work, and some of them did not know of Mendel or of his experiments before the Conference. As exceptions to this statement must of course be included the plant breeders from the Department of Agriculture, and of these notably Spillman, whose studies on wheat hybrids are well known. Curiously enough, the work of Spillman was not presented at the Conference.

Although hybridization formed the theme of perhaps most of the papers, not a little of the work was based on selection alone, or on selection as an aid to hybridization. The experiments of Orton, for instance, by which wilt-resistant varieties of cotton, watermelon and cow peas were obtained, consisted merely in the selection of individuals which were not subject to the disease in spite of the fact that they were growing in fields where it abounded. Roberts, on the other hand, succeeded in securing improved varieties of wheat by a system of crossing combined with rigid selection, and the same is true of other workers.

Interesting instances of the improvement of varieties by means of bud selection were also given. Powell, for example, selected

buds from the portions of apple trees which had superior fruit and used them as scions for grafting on more hardy stock. As a result of the third selection (generation) he obtains an apple which has the excellence of flavor of the earlier fruit to which has been added greater vigor and hardiness of the tree and greater uniformity of fruit.

Altogether, the report of the Conference will be very helpful to plant breeders as well as to those who are more particularly interested in the theoretical phases of the subject, and the Horticultural Society is to be congratulated on its excellent appearance.

W. A. Cannon.

PROCEEDINGS OF THE CLUB

Wednesday, November 30, 1904

The meeting was called to order at the usual hour at the New York Botanical Garden, Professor L. M. Underwood in the chair; twenty members present.

A painting of the Gloriosa Lily (*Methonica superba*) was received through President Brown from Mrs. Annie Eliza Scott Guerritore, of Naples, Italy. On motion a vote of thanks was ordered transmitted to Mrs. Guerritore and the picture was turned over to the Botanical Garden for exhibition purposes.

The following were elected to membership: Miss Mabel Denton of Paterson, N. J.; Mr. C. B. Robinson of New York City, and Dr. G. H. Shull of Cold Spring Harbor, N. Y.

The first paper on the scientific program was entitled "Recent Contributions to our Knowledge of Paleozoic Seed Plants" and was by Edward W. Berry.* It consisted of a brief discussion of recent contributions to our knowledge of those Paleozoic pteridophytes which had formed, or approximated the seed habit, the work of Professors Scott, Oliver, Kidston, Grand' Eury, Zeiller, and Renault. Especial attention was given to the work of Scott and of Oliver and to what amounted to a demonstration by them of seed-bearing in the Cycadofilicean genus *Lyginodendron* (*Sphenopteris*). Discussion by Drs. Britton andMacDougal followed.

* This paper was published in full in Torreya for December, 1904.

C. B. Robinson presented "Remarks on the Flora of Northern Cape Breton." To the north of the Bras d'Or Lakes, the island of Cape Breton consists of hills 800 to 1,500 feet in height, bordered by lowland of no great width along much of both coasts and in the numerous river valleys. The interior of the island is a plateau with large areas covered by barrens and sphagnum bogs. In passing eastward from New Brunswick to Nova Scotia, the flora becomes distinctly poorer, many species dropping out and few new ones appearing. Cape Breton with a smaller area than the rest of the province and forming its northeastern limit shows a further decrease, although a comparatively large number of forms are known from the island that do not occur on the mainland, while others grow more luxuriantly there, even at the extreme north. Among the former may be mentioned *Samolus floribundus* H. B. K. *Peramium Menziesii* (Lindl.) Morong, *Parnassia parviflora* DC., and *Galium kamtschaticum* Steller ; among the latter, *Cypripedium reginæ* Walt., *Caltha palustris* L., *Anemone canadensis* L., *Blephariglottis Blephariglottis* (Wild.) Rydb., *Vagnera stellata* (L.) Morong, and *Rubus Chamæmorus* L. The dwarf mistletoe *Razoumofskya pusilla* (Peck) Kuntze, apparently of wide distribution in northern Nova Scotia, extends at least fifty miles up the west coast of the island.

The ferns are also noteworthy. All the common and a majority of the rarer species of the mainland grow at least as well in Cape Breton, together with two additional species *Dryopteris Filix-mas* (L.) Schott and *Polystichum Lonchitis* (L.) Roth, the former widely distributed, but the latter known only from two widely separated localities. Discussion by Drs. Britton, MacDougal and Barnhart followed.

The third paper by Le Roy Abrams was entitled "Notes on the Flora of Southern California." After speaking briefly of the topography and general climatic conditions of southern California Mr. Abrams called attention to the extreme variation in the flora and exhibited a series of specimens illustrating the coastal and mountain floras. Among these specimens were three of his recently described new species : *Cheiranthus suffrutescens*, *Heuchera elegans* and *Godetia Dudleyana*.

Other especially interesting plants exhibited were *Romneya trichocalyx* Eastw., *Quercus Engelmanni* Greene, and *Calochortus Catalinæ* Wats.

The paper was discussed by Dr. Britton and Mr. Nash.

Adjournment followed.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Mr. William R. Maxon of the U. S. National Museum is spending several months in Guatemala, engaged in researches for the Bureau of Plant Industry.

With the January number, *The Plant World* passes under the management and editorship of Professor Francis E. Lloyd, of the Teachers College, Columbia University.

Professor H. Harold Hume, recently of the University of Florida, is now horticulturalist of the State Board of Agriculture of North Carolina, with headquarters at Raleigh.

F. M. Rolfs, lately of the Colorado Agricultural Experiment Station, has been appointed professor of botany and horticulture in the University of Florida, Lake City, Florida.

Professor F. S. Earle, director of the Estación Central Agronómica de Cuba, spent the last two weeks of December in New York and Philadelphia, sailing for Cuba again on the 31st.

At the December convocation of the University of Chicago, two candidates in botany, Minton Asbury Chrysler and Clifton Durant Howe, received the degree of doctor of philosophy.

The Apteryx, a quarterly devoted to natural history, published by the Roger Williams Park Museum of Providence, Rhode Island, C. Abbott Davis, editor, begins its existence with the number for January, 1905.

The daily papers announce the death of Rev. F. D. Kelsey, pastor of the Central Congregational Church of Toledo, Ohio, and formerly professor of botany in Oberlin College, at the age of fifty-six years.

Miss Anna M. Clark (A. M., Columbia University, 1904), author of a descriptive work on "The Trees of Vermont," has been appointed teacher of "science and nature study" in the New York City Training School for Teachers.

We learn from *Science* that Dr. W. A. Kellerman, professor of botany in the Ohio State University, will spend the months of January, February and March in Guatemala, studying and collecting the parasitic fungi of that country.

At the annual meeting held on January 10, Judge Addison Brown resigned the presidency of the Torrey Botanical Club, after completing fifteen years of service in that office. Dr. H. H. Rusby was chosen as his successor.

The Boston Evening Transcript notes that Mr. C. G. Pringle has recently returned to the University of Vermont with a collection of 25,000 specimens of plants, representing about 600 species, secured during an eight months' visit to Mexico.

Dr. Burton E. Livingston, instructor in plant physiology in the University of Chicago, has accepted an appointment to a position in the Bureau of Soils of the United States Department of Agriculture and expects to begin his new duties on April 1.

The American Mycological Society held meetings in Philadelphia during the Christmas holidays in connection with the American Association for the Advancement of Science and other affiliated societies. The officers for 1905 are: president, Mr. C. H. Peck; vice-president, Professor F. S. Earle; secretary, Mr. C. L. Shear.

Nature Study, published at Manchester, New Hampshire, was discontinued with the number for July, 1904. *The Nature-Study Review*, a bimonthly, with Professor M. A. Bigelow of the Teachers College, Columbia University, as managing editor, has begun its first volume with the issue for January, 1905.

In the discussion of "The Mutation Theory of Organic Evolution" before the American Society of Naturalists at Philadelphia, December 28, botany was represented by Dr. D. T. MacDougal of the New York Botanical Garden, who spoke from the standpoint of "Plant Breeding," and by Professor Liberty H.

Bailey of Cornell University, who spoke from the standpoint of "Taxonomy."

The Sullivant Moss Chapter met at the Academy of Natural Sciences, Philadelphia, December 31, 1904. There was an exhibit of specimens and photographs, and five papers were read. The officers for 1905 are: president, Mr. Edward B. Chamberlain; vice-president, Mrs. Carolyn W. Harris; secretary, Miss Mary F. Miller; treasurer, Mrs. Annie Morrill Smith.

According to a San Francisco letter in the *New York Times* of January 1, the Carnegie Institution has awarded to Mr. Luther Burbank, of Santa Rosa, California, a grant of $10,000, with prospect of annual renewal for a period of ten years, in order to further his experiments in plant breeding. We learn from *Science* that Mr. Burbank has been appointed a special lecturer in Stanford University.

At the meeting held in Philadelphia, December 27–31, 1904, the Botanical Society of America, the Society for Plant Morphology and Physiology, and the American Mycological Society approved a preliminary plan for a proposed merger of these three societies under the name of the Botanical Society of America. The details of the constitution of the new society are to be formulated by a joint committee during the coming year.

The eighth meeting of the Society for Plant Morphology and Physiology was held at the University of Pennsylvania, December 28–30, 1904. Seventeen papers were read. The address of the retiring president, Dr. George T. Moore, was upon "Applied Botany and its Dependence upon Scientific Research." The following officers were elected for the ensuing year: President, Professor E. C. Jeffrey; vice-president, Dr. C. O. Townsend; secretary-treasurer, Professor W. F. Ganong. Professor W. G. Farlow was chosen delegate to the International Botanical Congress at Vienna.

The Wild Flower Preservation Society of America held a meeting in Biological Hall, University of Pennsylvania, December 30, 1904. The destructive effects of forest fires formed the chief topic discussed. Reports of officers were read. Reso-

lutions deploring the havoc caused by fires and offering the co-operation of the society in efforts to lessen this evil were adopted for presentation to the American Forest Congress, called to meet in Washington, D. C., January 2–6, 1905. Officers for the ensuing year are: President, Professor C. E. Bessey; vice-president, Mr. Joseph Crawford; secretary, Mrs. N. L. Britton; treasurer, Dr. C. E. Waters.

The American Association for the Advancement of Science held its fifty-fourth annual meeting at the University of Pennsylvania, Philadelphia, December 27–31, 1904, under the presidency of Professor W. G. Farlow. Papers represented by 37 titles were offered before Section G (botany), including several by title only. Dr. B. L. Robinson occupied the chair. The vice-presidential address of Professor Thomas H. Macbride, retiring chairman of Section G, was upon "The Alamogordo Desert," and was illustrated by numerous lantern photographs. For 1905, Dr. Erwin F. Smith was elected chairman of Section G, Professor F. E. Lloyd continuing to serve as secretary. Professor C. R. Barnes, Mr. C. L. Shear and Dr. H. C. Cowles were appointed delegates to the International Botanical Congress to be held in Vienna in June, 1905.

The Botanical Society of America held its eleventh annual meeting at the University of Pennsylvania December 27–30, 1904, under the presidency of Mr. Frederick V. Coville. The address of the past-president, Professor C. R. Barnes, was entitled "The Theory of Respiration." In addition to the address, twenty-one papers were presented. Officers were elected as follows: President, Professor R. A. Harper; vice-president, Professor E. A. Burt; treasurer, Dr. Arthur Hollick; secretary, Dr. D. T. MacDougal; councillors, Professor L. M. Underwood and Professor William Trelease. Grants of $200 to Professor G. F. Atkinson to aid investigations on the fungi, and of $75 to Mr. Frederick V. Coville to facilitate work on the relation of plants to moisture were approved. Professor J. C. Arthur was chosen to represent the Society at the International Botanical Congress in Vienna.

Botanical visitors in New York since July 1, not already noted in TORREYA, include Mr. O. W. Barrett, Agricultural Experiment Station, Mayagüez, Porto Rico; Professor Douglas H. Campbell, Stanford University, California; Dr. E. H. Eames, Bridgeport, Conn; Professor Vladislaw Rothert, Odessa, Russia; Professor B. M. Duggar, University of Missouri, Columbia, Mo.; Mrs. Flora W. Patterson, Mr. W. F. Wight, Mr. William R. Maxon, Mr. C. E. Waters, Mr. Jesse B. Norton, and Mr. E. L. Morris, Washington, D. C.; Dr. Margaret C. Ferguson, Wellesley College, Wellesley, Mass.; Dr. George H. Shull, Station for Experimental Evolution, Cold Spring Harbor, N. Y.; Mr. Alfred Rehder, Jamaica Plain, Mass.; Dr. C. F. Millspaugh, Field Columbian Museum, Chicago; Mr. John F. Cowell, Director of the Botanic Garden, Buffalo, N. Y.; Professor Alexander W. Evans and Professor Arthur H. Graves, Yale University, New Haven, Conn.; Mr. Charles Louis Pollard, Springfield, Mass.; Mr. N. Ohno, Tōkyō, Japan; Professors F. S. Earle, and Mel. T. Cook, Estación Central Agronómica de Cuba, Santiago de las Vegas, Cuba; Professor J. E. Kirkwood, Syracuse University, Syracuse, N. Y.; Mr. John Macoun, Ottawa, Canada; Professor L. H. Pammel, Ames, Iowa; Dr. W. A. Cannon, Desert Botanical Laboratory, Tucson, Arizona; and Professor P. H. Rolfs, Miami, Florida.

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GALTONIAN REGRESSION IN THE "PURE LINE"*

By George Harrison Shull

Among the experiments undertaken this year at the Station for Experimental Evolution for the purpose of investigating the inheritance of characters in plants, was one intended to be essentially a repetition of Johannsen's studies † in the inheritance of seed-weights in beans. The variety of *Phaseolus vulgaris* chosen for this study proved to be unsatisfactory from a technical standpoint and it is not proposed to pursue the experiment further with this material, though several subsidiary questions may be taken up in other plants. The relation between the results of Johannsen on beans and those of Galton on sweet-peas ‡ have appeared on further analysis to be in need of reinterpretation rather than reinvestigation, and the writer feels justified, therefore, in taking this abandoned experiment as a text for such reinterpretation.

From a number of statistical studies upon various characters in man and animals and a single series of experiments in sweet-peas, Galton derived his law of natural inheritance and its corollary — the law of regression from mediocrity. || The law of natural inheritance is, briefly, that the offspring of any

* Presented before Section G, A. A. A. S., at Philadelphia, December 30, 1904, under title of "Inheritance in Pure Lines."

† Ueber Erblichkeit in Populationen und in reinen Linien. Jena: Fischer, 1903.

‡ Natural inheritance. New York: Macmillan & Co., 1889.

|| This has frequently been called "regression *toward* mediocrity," but as the coefficient of regression is measured *from* the mean condition of the population confusion has arisen through expressing it in this way. Galton's own inconsistency in discussions of regression is doubtless responsible for this confusion. He first presents it clearly as a deviation *from* mediocrity, but later says there is "no regression at all" when this deviation is equal in the two kinships under comparison, and the coefficient of regression is unity. *Cf.* Natural inheritance 95–98 with 132–133.)

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parentage, when considered in its entirety, inherits one-half its characteristics from its parents, one-fourth from its grandparents, one-eighth from its great-grandparents and so on. The law of regression from mediocrity points out that the children of extreme parents are not on the average so extreme as their parents, though they deviate in the same direction from the mediocre condition of the race. As an example of regression, take Galton's results on sweet-peas : The diameter of parent seeds which produced plants having on the average seeds of the same diameter was 3.94 mm. Assuming this to be the mediocre condition of the strain he was using he found that whatever the parental deviation from this diameter the mean filial deviation was in the same direction, but only one-third as great. Thus the offspring from seeds 5.34 mm. in diameter produced seeds having an average diameter of $3.94 + \frac{5.34 - 3.94}{3} = 4.41$ mm. (observed diameter, 4.44 mm.).

Johannsen obtained similar results in beans when he compared the average weight of seeds in the offspring with the weight of the parent seeds, if the latter were selected solely with reference to the weight of the individual seeds and without regard to the pre-parental ancestry ; but when he separated the individual "pure lines" he found that the mean weight of seeds in the offspring is the same on the average as that of the preceding generations in the same "line," in other words, plants produced from small seeds bear seeds of the same average weight as do plants which are produced from large seeds having the same ancestry.

By the "pure line" Johannsen means a series of individuals related only through the process of self-fertilization. On *a priori* grounds it seems proper to apply the term to every series of individuals that do not combine the elements of two or more ancestral lines through the equivalent of a sexual process. Thus, so far as hereditary qualities are concerned, there should be no reason to expect in a self-fertilizing population, conditions different from those in a population related through budding or other method of vegetative reproduction, provided of course, that the self-fertilizing population has not been so re-

cently modified by a cross as to allow the analysis and recombination of characters derived from different ancestral lines.

The complete return of the offspring of an extreme parent, to the mean condition of the "pure line" to which it belongs, or in technical language the entire want of "regression" in the "pure line," is presented by Johannsen as a fundamental exception to the conclusions of Galton.

Weldon and Pearson have criticized * the work of Johannsen in considerable detail and although the tone of their criticism is adverse throughout, they grant that his main contention may well be true, that small seeds and large seeds of the same plant do not give rise to plants bearing small seeds and large seeds respectively. If read aright, their criticism must be held to be confirmatory in so far as Johannsen's data are capable of biometric analysis. Certainly their conclusion that his results are closely identical with those found for other plants and for animals when we compare *mean* parental and *mean* filial characters, agrees precisely with that reached by Johannsen, for these *means* represent the condition in the *population* or mixture of several "pure lines," and not in the individual "*pure line*."

The relation between this work of Johannsen and that of Galton on sweet-peas may now be considered. In the first place, the actual results were the same when the treatment of the material was the same, and in so far the work of Galton was confirmed; but when the "pure lines" were followed separately they were found to offer an apparent exception in the complete return of the offspring of extreme parents to the mean condition of the "pure line." Instead of this being fundamentally opposed to Galton's results, however, it is the condition which should have been derived *a priori* from Galton's "Law of natural inheritance."

Regression is lucidly explained by Galton † as due to the fact that the child inherits partly from his parents, partly from his more remote ancestry, and that if "traced far backwards his ancestry will be found to consist of such varied elements that they are indistinguishable from a sample taken at haphazard from the

* Inheritance in *Phaseolus vulgaris*. Biometrika, 2: 499–503. N 1903.

† Natural inheritance, 105.

general population, . . . in other words it will be mediocre." Now, if the mean condition of the parental generation and of each preceding generation in the same line deviates to the same degree from the mean condition of the population, it becomes an inevitable inference that in so far as hereditary influences are concerned, the offspring must have the same mean character regardless of the largeness or smallness of the individual seeds from which those offspring have developed.

This "fixity of type" which Johannsen finds in the "pure line" was recognized by Galton in his treatment of pure breeds* and it seems strange that he did not perceive that his sweet-peas which he recognized and described as a self-fertilizing population were at variance with this fixity of type in the pure breed. Johannsen has brought harmony in Galton's results where there was a previously unnoted discord, and has confirmed the laws of "natural inheritance" and of "regression from mediocrity" as applied to the characters of self-fertilizing populations.

An important point which is brought out by these results of Johannsen both from a scientific and an economic standpoint is that the weight or size of an individual seed is not the hereditary unit, but the character of all the seeds of each plant considered as a whole. A plant which produces small seeds in general, may produce some seeds which are larger than the smallest seeds of another plant which produces large seeds in general, so that when the student of heredity wishes to use seed-characters or presumably any other repeated character, he must seek the general condition of the character in question in each plant and not depend upon the character of single seeds or single other repeated organs.

The economic application of this important principle is obvious. It has been very generally maintained by horticulturists that varieties deteriorate as the result of the selection of small seeds, tubers, etc., for propagation, but this proposition, while satisfying a certain sense of logic, has rested on no scientific research. The fixity of type in the "pure line" which now appears to be established, shows that no such deteriorating effect

* Natural inheritance, 189.

will be produced so long as the seeds are large enough to produce vigorous plants.

The farmer and the plant-breeder may plant the small potato tubers or the small seeds without any danger of deterioration in the yield and quality of the crop provided they select these tubers or seeds from plants which yield the largest quantity and the finest quality of tubers or of seeds.

STATION FOR EXPERIMENTAL EVOLUTION,
COLD SPRING HARBOR, LONG ISLAND.

SOIL WATER IN RELATION TO TRANSPIRATION

BY V. M. SPALDING

In a recent article by the writer on the creosote bush in its relation to water supply,* the statement was made that the amount transpired appears to stand in direct relation to the amount of water available in the soil in which the plant is growing. Further observations on this and some other desert plants not only confirm this view but go to show that water in the soil is a controlling factor, and that even as efficient an agent as light may, in comparison, take quite secondary rank.

The later literature of transpiration, however voluminous in general, is extremely limited as regards this branch of the subject.† Aloi and Ferruzza have shown that the amount of water in the soil is a factor by which the opening of stomata, and consequently the rate of transpiration, is controlled, and Stenström has attempted to formulate a mathematical equivalency between the rate of transpiration and the ratio of atmospheric and soil moisture. The remaining literature dates from the works of Sachs and older writers.

In the summer of 1904, while engaged in observing the influence of light of different degrees of intensity on transpiration, I found that results apparently conflicting became consistent when account was taken of the amount of water supplied to the plants under investigation and the time at which it was given.

* Botanical Gazette, 38: 122. 1904.

† Burgerstein, A. Die Transpiration der Pflanzen, 137. 1904.

The plants employed were seedlings of the creosote bush (*Covillea*) and palo verde (*Parkinsonia Torreyana* and *P. aculeata*) growing in cans and supplied with measured quantities of water at stated intervals. The rate of transpiration was determined by placing the plants under a bell-jar, with suitable precautions to prevent the absorption or escape of water vapor, the amount of water transpired being derived from readings of a hygrometer. As details will be given elsewhere, a brief résumé of experiments and results will be sufficient for the present purpose.

Beginning with the palo verde, two sets of plants, one serving as a check on the other, were used. August 11, the plants having been well watered the day before, the rate of transpiration was determined. The following day, August 12, the plants meantime having received no water, but having been treated precisely as before, as regards light and other controllable conditions, the rate of transpiration was found to be only 52.6 and 38.5 per cent. as high as it was on the preceding day, a result apparently attributable to nothing else than the diminished quantity of water in the soil in which the plants were growing.

The same plants were again placed under observation August 18, having been given no water since August 15. External conditions were favorable to transpiration, full sunlight, a fresh breeze, and rather high temperature. At 11:40 A. M., after the rate of transpiration had been noted, number 1 was given one ounce, and number 2 three ounces of water. At 1:15 P. M., the rate of transpiration of number 1 was found to be the same as at the time of the preceding observation, while that of number 2 was twice as great. At 4 P. M., observations were again made, and at this second afternoon reading it was found that number 1 was transpiring twice and number 2 four times as rapidly as at the time of the forenoon observation.

The following forenoon the rate of transpiration of number 2 was found to be nearly four times as great as that of number 1, a striking difference when it is considered that only twenty-four hours earlier their rate had been the same, explainable, it would seem, only by recalling the fact that when the observations began on the morning of August 18, both sets of plants were in dry

soil, but on the following day number 2 had received three times as much water as number 1, and probably on account of sub-irrigation was able to utilize a greater percentage of what was given to it.

Experiments with *Covillea* gave even more striking results. September 5, the transpiration of two plants, designated 1 and 2, was determined in the forenoon between 11 and 12, and again in the afternoon between 3 and 4 o'clock. Number 2 was given three ounces of water at 12:20, none being given to number 1. At the time of the afternoon observation it was found that number 2 was transpiring more than three times as rapidly as it was before the water was given to it, and number 1, which was not watered, was transpiring only one-fifth as rapidly as it was in the forenoon.

Observations were also made for the purpose of ascertaining the effect of exposure to direct sunlight in conjunction with water supply. It was found that exposure to bright sunlight was uniformly followed by accelerated transpiration, whenever the plant under observation had a full supply of water, but that otherwise such acceleration did not take place.

It is noteworthy that plants which had all along received a meagre supply of water were nevertheless in a position to transpire rapidly when once a full supply of water was furnished them, while plants which from the beginning had received a very large amount of water showed promptly a marked lowering in rate of transpiration when the water supply was reduced.

With so complicated a problem general statements may well be made with extreme caution, but the evidence in the present case is sufficient to show that in studies of transpiration it is altogether unsafe to attempt to estimate any other factors whatever without taking due account of water in the soil.

Desert Botanical Laboratory of the Carnegie Institution,
Tucson, Arizona.

A KEY TO THE STIPITATE POLYPORACEAE OF TEMPERATE NORTH AMERICA — I

BY WILLIAM A. MURRILL

KEY TO THE GENERA

Surface of hymenophore covered with reddish-brown varnish. **A.** GANODERMA
Surface of hymenophore not as above.
  Tubes hexagonal and radially elongated. **B.** HEXAGONA
  Tubes not as above.
    Stipe compound. **C.** GRIFOLA
    Stipe simple.
      Context white.
        Plants fleshy, terrestrial. **D.** SCUTIGER
        Plants tough, epixylous.
          Pileus inverted, erumpent from lenticels. **E.** PORODISCUS
          Pileus erect, not erumpent.
            Context homogeneous, firm. **F.** POLYPORUS
            Context duplex, spongy above, woody below. **G.** ABORTIPORUS
      Context brown.
        Hymenium concentrically lamelloid. **H.** CYCLOPORUS
        Hymenium poroid.
          Spores white. **I.** ROMELLIA
          Spores brown.
            Pileus erect, stipe central. **J.** COLTRICIA
            Pileus inverted, pendent. **K.** COLTRICIELLA

A. THE STIPITATE SPECIES OF GANODERMA

1. Context ochraceous to fulvous; plant perennial on deciduous trees. *G. flabelliforme* (Scop.) Murrill
   Context pallid; plant annual on hemlock. *G. Tsugae* Murrill

B. THE STIPITATE SPECIES OF HEXAGONA

1. Surface glabrous to fibrillose, not distinctly hispid. 2
   Surface hispid; tubes small; context thin, translucent. *H. floridana* Murrill
2. Pileus reniform at maturity; stipe usually much reduced. 3
   Pileus flabelliform; stipe usually very distinct, equaling the pileus at times in length; tubes of medium size. *H. daedalea* (Link) Murrill
3. Tubes large; surface of pileus decorated with imbricated reddish-brown fibrils, which disappear with age. *H. alveolaris* (DC.) Murrill
   Tubes much smaller, the mouths rarely over 1 mm. long and 0.5 mm. broad; surface of pileus glabrous. *H. micropora* Murril

C. The Species of Grifola

1. Hymenium ochraceous, becoming dirty-yellow with age; plants terrestrial, irregularly confluent, olivaceous to greenish-yellow. *G. poripes* (Fr.) Murrill
   Hymenium white or pallid, sometimes becoming fuliginous, but never ochraceous. 2
2. Surface of pileus gray or grayish-brown to coffee-colored; stipe intricately branched; lobes numerous and small. 3
   Surface of pileus pallid or alutaceous; stipe not intricately branched; lobes usually few in number and comparatively large. 5
3. Pileoli centrally attached, circular and umbilicate. *G. ramosissima* (Scop.) Murrill
   Pileoli lateral, spatulate or dimidiate. 4
4. Hymenium white, not changing color; surface of pileus gray or grayish-brown. *G. frondosa* (Dicks.) S. F. Gray
   Hymenium white, becoming fuliginous on drying or when bruised; surface of pileus coffee-colored. *G. Sumstinei* Murrill
5. Sporophore of immense size, 20–60 cm. in diameter; spores echinulate, 8–9 μ. *G. Berkeleyi* (Fr.) Murrill
   Sporophore 8 cm. or less in diameter; spores smooth, ovoid, much smaller. *G. fractipes* (B. & C.) Murrill

D. The Species of Scutiger

1. Surface of pileus uneven, squamose or rugose. 2
   Surface of pileus smooth, tomentose or glabrous. 4
2. Pileus sulfur-yellow, pleuropous; surface ornamented with imbricated floccose wart-like scales; context white or yellowish; tubes small, angular, decurrent, white, becoming greenish when wounded, yellowish when dry; spores $9 \times 6\,\mu$. *S. Ellisii* (Berk.) Murrill
   Pileus brown. 3
3. Tubes large, 1.5 mm. or more in diameter, hexagonal; surface of pileus smoky-brown ornamented with darker imbricated tufts of appressed hairs; context white; stipe excentric, its entire surface reticulate. *S. retipes* (Underw.) Murrill
   Tubes small, 0.5 mm. in diameter, polygonal, decurrent, white; pileus reddish-brown, rugose; stipe central, not reticulate. *S. decurrens* (Underw.) Murrill
4. Pileus light-colored: white, yellow or blue. 5
   Pileus dark-colored: gray or brown. 7
5. Pileus white; context white; tubes irregular, dissepiments thin, white; plants small, growing upon grass-roots; stipe short, dark-brown. *S. cryptopus* (Ell. & Barth.) Murrill
   Pileus yellow to orange, glabrous; stipe short, concolorous; tubes short, small, $1–2 \times 0.2$ mm., decurrent; spores ovoid, hyaline, $4 \times 5–6\,\mu$. *S. laeticolor* Murrill
   Pileus blue when fresh, changing to brown on drying. 6
6. Tubes entire, becoming reddish-brown on drying; context ochraceous, and pileus and stipe reddish-brown in herbarium specimens. *S. caeruleoporus* (Peck) Murrill

Tubes lacerate, fading to grayish-brown or dirty white; context nearly white; pileus and stipe dull smoky-brown when dry. *S. holocyaneus* (Atk.) Murrill

7. Stipe black and rooting. 8

Stipe neither black nor rooting. 9

8. Pileus smoky-brown, subtomentose; margin thin, inflexed; context white; tubes regular, polygonal, entire, 2 mm. long, 0.5 mm. in diameter; stipe cylindrical, light-brown above, black and rooting below; spores white, elliptical, $7 \times 5\,\mu$. *S. radicatus* (Schw.) Murrill

Pileus drab-colored, nearly glabrous; margin thin, inflexed when young; context milk-white even when dry; tubes white, irregular, toothed, 1 mm. long, 0.25 mm. in diameter; stipe short, sooty-black as far as the decurrent tubes, attached to buried wood; spores white, $3–4 \times 5–7\,\mu$. *S. subradicatus* Murrill

9. Pileus gray, glabrous or nearly so; margin very thin; context rosy-gray, soft, fleshy, thin when dry; tubes small, 0.25–0.5 mm., unequal, decurrent; stipe short, concolorous. *S. griseus* (Peck) Murrill

Pileus brown. 10

10. Stipe dark-purple, very thick; pileus fulvous-brown, purplish at times, clothed with short tomentum, margin very obtuse; context reddish beneath the cuticle, marked when dry with a black concentric line limiting growth; tubes white, 2 to a mm. *S. persicinus* (B. & C.) Murrill

Stipe yellowish-brown, usually excentric; plants cespitose; pileus yellowish-brown, pruinose; margin thin; context rose-tinted when dry, dark-red next to the tubes, which are small, $1–3 \times 0.3$ mm., decurrent, rose-colored when dry, the edges fimbriate. *S. Whiteae* Murrill

A PALM FROM THE MID-CRETACEOUS *

By Edward W. Berry

The enormous number of existing palms, considerably over one thousand species, are about equally divided between the oriental and occidental tropics, with many monotypic genera, showing well the marked effects of geographical distribution and isolation on the formation of species. There are no outlying forms, the highest northern latitude reached being about 43° in Europe, and the highest southern latitude about 45° in New Zealand.

Lesquereux writing in 1878 † records fossil palms in 52° north latitude in both America and Europe. Since then remains have been described from as far north as 80° (Grinnell Land, Spitzbergen), and two fine species are recorded from the Tertiary

* Published by permission of the Maryland Geological Survey.

† Tertiary Flora.

of Greenland (latitude 70°). A variety of Paleozoic remains have been referred to the Palmae, ranging from Stigmaria trunks to Cordaitean leaves and fruits; the nature of the latter having been first rightly conjectured by Brongniart in 1828 *. With the marvellous increase, during the last twenty-five years, of our knowledge of the vegetation of the Paleozoic, we can now positively affirm that palms are unknown from pre-Mesozoic formations.

Stenzel, who has recently monographed † the fossil palm-wood of the world, finds the oldest known wood to come from the Turanian of France (1 species); the succeeding formation, the Senonian, has yielded him six species; and, with the ushering in of the Tertiary, the species become numerous.

Undoubted remains of palm-leaves occur somewhat earlier, and the Mid-Cretaceous, in the light of our present knowledge, marks the introduction of this type.

The Cenomanian of Europe has furnished undoubted palm-leaves, and Stur ‡ has described fruit from that formation in Bohemia, and Fliche from the same horizon in France. The next formation, the Senonian, shows species in a variety of genera (*Nipadites*, *Flabellaria*, etc.). It is in the Tertiary, however, that palms become greatly developed and widespread, and the numerous species founded on stems, leaves, petioles, fruits, and even flowers, are referable to a large number of genera (*Geonoma*, *Manicaria*, *Phoenix*, *Nipa*, *Chamaerops*, *Oreodoxites*, *Sabal*, *Iriartea*, *Latanites*, etc.). In this country the earliest known remains are those small fragments of striated leaves, of a rather doubtful nature, which Lesquereux described § as *Flabellaria minima* from the Dakota group (Cenomanian).||

The Montana group, of Senonian or possibly Danian age, has furnished Knowlton ¶ with the undoubted remains of a large

* Prodrome Hist. Végét. Foss.

† Beitr. Palaeont. u. Geol. Oesterr. Ungarn. 1–182. *pl. 1–22.* 1904. [Folio.] (I am indebted to Dr. F. H. Knowlton for an abstract of this work.)

‡ Verhandl. k. k. Geol. Reichsanstalt. Wien. 1873.

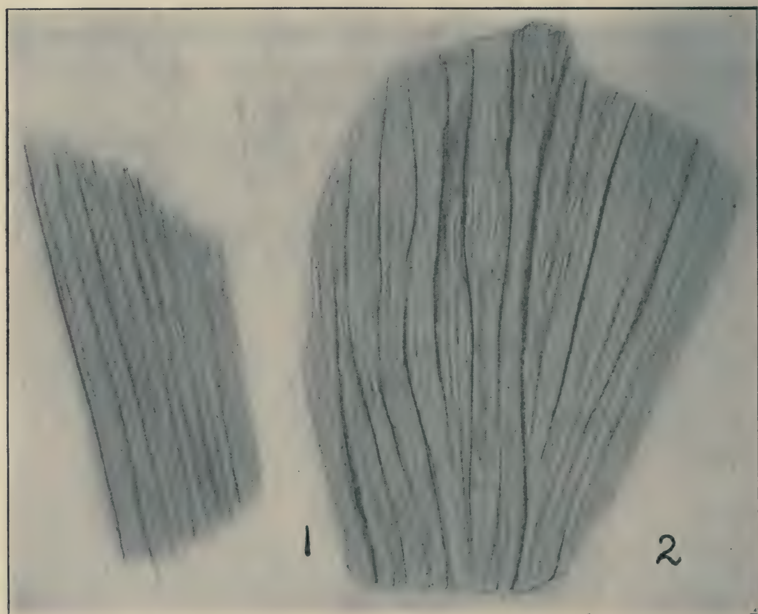
§ Cret. Flora, 56. *pl. 30. f. 12.* 1874.

|| It is now definitely decided that Hollick's supposed palm, *Serenopsis*, from the Raritan of Long Island, is a *Nelumbo.*

¶ Bull. U. S. Geol. Surv. 163 : 32. 1900.

palmetto-like form (*Sabalites*)*, while the Laramie (Danian) furnishes a number of species, some of which, represented by both leaves and fruit, continue through the Eocene and help to make up the abundant palm flora of the early Tertiary in this country.

The characters of fragments of leaves or rays are rarely definite enough for specific or even generic diagnosis, and usage has sanctioned their reference, in cases of doubt, to the genus *Flabellaria* of Sternberg, which, while including some anomalies,



is properly used for those large flabellate leaves, which from the nature of the remains it is impossible to refer positively to *Sabal* (*Sabalites*), *Geonomites*, etc., as is the case with the specimens before me.

Flabellaria magothiensis sp. nov., *figs. 1 & 2*.—Fragmentary remains of large, palmetto-like leaves of considerable consistency; some specimens showing long parallel corrugations, the finer structure being destroyed (*fig. 2*); others finely veined with somewhat heavier veins 2 to 4 mm. apart (*fig. 1*).

* Dawson has also described a *Sabal* from the upper Cretaceous of Nanaimo.

Collected by Bibbins & Berry at Grove Point, Maryland, and Deep Cut, Delaware.

The remains are most numerous at the former locality, where many specimens were collected, the largest 8 cm. square.

They occur in thin layers of clay intercalated between thicker layers of white sand, and from the nature of the deposit and the awkward point of outcrop (beneath an overhanging bluff of clay) it is impossible to get out anything like complete material.

I have no doubt that with the expenditure of much time and labor, better specimens could be secured, and would have deferred publication were it not for the interest attached to so early a species of palm, and I have no doubt that it is a palm, whatever its generic affinities may subsequently be found to be. It is certainly much more positive material than Lesquereux's from the Dakota group, and the figures but poorly depict the specimens which are particularly difficult to represent. Both of the outcrops where these remains occur are in the upper part of what Darton* called the Magothy formation, and which Ward† and others would include in the Raritan. Dr. Wm. B. Clark has recently ‡ suggested that they may be correlated with the exposure at Cliffwood, N. J., thus forming transition beds between the Albian and the Cenomanian. The flora of Cliffwood has certainly a Cenomanian facies, and it remains for an exhaustive study of the flora of the Magothy to determine positively its exact age according to European standards.

Passaic, N. J.

SHORTER NOTES

Galactia Curtissii sp. nov. — A shrub, 6 dm. high or less, widely branched, densely tomentulose all over, the branches terete. Leaves 3-foliolate; stipules subulate, 2–3 mm. long; petiole stout, 2 cm. long or less; leaflets oblong, oblong-lanceolate or oblong-oblanceolate, broadest at about the middle, thick, light-green, obtuse at both ends, or subcordate at the base, finely and strongly reticulate-veined beneath, 3–6 cm. long, 2 cm. wide or less, the

* Darton, Am. Jour. Sci. III. **45**: 407–419. 1893.

† Ward, Am. Rep. U. S. Geol. Surv. **8**^{2}: 871. 1889; *ibid.* **15**: 372. 1895.

‡ Clark, Am. Jour. Sci. IV. **18**: 435–440. 1904.

lateral ones short-stalked, the terminal one 8–12 mm. long: spikes shorter than the leaves, simple or compound, interrupted, several- to many-flowered: calyx campanulate, about 7 mm. long, its teeth triangular-lanceolate, acute, tomentose, the longer ones nearly twice as long as the tube: corolla purple; standard nearly orbicular, short-clawed, about 8 mm. in diameter, about as long as the longer-clawed wing-petals: legume linear, brown-tomentulose, 4–4.5 cm. long, 5 mm. wide: seeds dull, obliquely oval, 3 mm. long.

Nueva Gerona, Isle of Pines, Cuba, *A. H. Curtiss*, 1904, *no. 402.*

Related to the Mexican *Galactia multiflora* Robinson.

N. L. Britton.

Panaeolus acidus sp. nov. — Pileus 1–3 cm. across, convex then expanded almost plane, smooth, slightly fleshy at the disk, very thin at the margin, brown with yellow tinge; gills adnate, 2–3 mm. broad, black with white edge; stem 8–10 cm. high, slender, hollow, equal, concolorous, 2–3 mm. thick; spores black, broadly ovate, pointed at each end.

Growing in a cluster on the bottom of a box in a cellar. The box contained a large bottle of acetic acid which had been broken and the contents emptied on the bottom of the box. The plant grew on this saturated wood.

In drying the color of the pileus became darker and the edges reflexed. In general appearance it resembles *Psilocybe foenisecii* (Pers.) Fr., but the black spores readily distinguish it from that species.

Type specimens are in the Carnegie Museum, Pittsburg, Pa.

D. R. Sumstine.

Kittanning, Pa.

PROCEEDINGS OF THE CLUB

Tuesday, December 13, 1904

The meeting was held at the College of Pharmacy, Dr. H. H. Rusby in the chair, eleven members present.

Resignations were accepted from Miss Hannah S. Wingate and Mrs. Emily H. Terry, and from Messrs. Samuel Sloan, R. H. Lawrence and F. W. Kobbé.

The following were elected to membership: Miss Alice A. Knox, Barnard College, New York City; Miss Amelia R. Goodlatte, Passaic, N. J.; Miss Lenda T. Hanks, Girls' Technical High School, New York City; Miss Mary F. Barrett, 19 Elm Street, Bloomfield, N. J.; Mr. LeRoy Abrams, N. Y. Botanical Garden.

The first paper on the program was by Professor F. E. Lloyd, who spoke of the Desert Botanical Laboratory at Tucson, Arizona. He pointed out that there were four characteristic types of desert visible with great regularity from the car window westward from El Paso, as the train passed from mesa to hill country or *vice versa*. The character-plants of these four deserts, which are remarkably distinct and pure, are *Yucca*, *Ephedra*, mesquite, *Parkinsonia* and *Fouquieria*, in abundance. Professor Lloyd spoke in some detail of the vegetation in the vicinity of Tucson, illustrating his remarks with numerous excellent photographs, including several good pictures of *Cereus giganteus* in bloom and in fruit.

It was remarked that the plants with motile leaves, such as *Cassia*, *Acacia* and *Parkinsonia*, all faced the sun at sunrise, but did not follow its course during the day. *Fouquieria* was described in detail, attention being called to its short-lived primary leaves and curious spines which were cited as an example of direct metamorphosis, the rosettes of secondary leaves appearing in the axils of the latter. The primary object of Professor Lloyd's stay at the laboratory was the determination of the relation between stomatal action and transpiration. Numerous experiments were made, the results of which are to be reported in detail later.

The second paper, by Mr. George V. Nash, was on the vegetation of Inagua. Mr. Nash recently spent four weeks in collecting there. Inagua includes a large and a small island located some sixty miles northeast of Cuba, and with a total area of between five and six hundred square miles of mostly low land, the highest point reaching only 132 feet above the sea.

The flora is poor, embracing some 350 or 400 species, the relatively numerous cacti in the genera *Opuntia*, *Cactus*, *Melocactus*, and *Pilocereus* emphasizing the desert-like conditions pre-

vailing on the islands. Five plant areas were differentiated :— (1) that of the Strand; (2) the Scrub, where nearly all the endemic species of the islands have been found; (3) the White Sand or White Land as it is called locally, characterized by a species of *Coccothrinax;* (4) the Salinas, characterized by the shrub *Avicennia nitida* Jacq.; and (5) the Savannas, where *Conocarpus sericea* Forst. is the characteristic shrub and *Sporobolus virginicus* the common grass. In the numerous salt-holes is found the only fern of the islands, *Acrostichum aureum.*

Excellent photographs were exhibited showing the dwarfing effect of the sharp winds of the southern coast, where the vegetation, elsewhere six or eight feet tall, is reduced to a foot or two in height and becomes widely spreading.

One of the results of Mr. Nash's trip was the extension of the range of *Pseudophoenix Sargenti* about 350 miles to the southward; another the collection of a number of new species. Numerous photographs, and specimens from each of the plant areas, illustrated the speaker's various points.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Dr. and Mrs. N. L. Britton and Dr. Marshall A. Howe, of the New York Botanical Garden, and Dr. C. F. Millspaugh of the Field Columbian Museum, Chicago, are devoting several weeks to botanical explorations in the Bahamas.

The extensive botanical collections and library of Capt. John Donnell Smith, of Baltimore, have been presented by him to the Smithsonian Institution. All the old-world plants, and all of the American orchids, grasses, sedges and lower cryptogams, are already in Washington. The remainder of the American specimens, and all of the books, are to remain in Capt. Smith's possession as long as he may wish to retain them.

Vol. 5 No. 3

TORREYA

March, 1905

THE EARLY WRITERS ON FERNS AND THEIR COLLECTIONS — IV. Presl, 1794–1852; John Smith, 1798–1888; Fée, 1789–1874; and Moore, 1821–1887

By L. M. Underwood

The real enlargement of the conception of fern genera commenced with Presl and continued with John Smith, Fée and Moore, who were the generic "splitters" in this group of plants. The form of the sporangium had early served to distinguish families, and genera were characterized by the varied distribution of the sporangia over the leaf-surface, combined with the shape of the indusium. Under this method of distinguishing genera Swartz had recognized 38 genera in 1806, and Willdenow 43 in 1810; Desvaux, more liberal, recognized 70 in 1827, and Sprengel the same year found only 66. These numbers were nearly up to the Hookerian standard, for in the *Synopsis Filicum* of 1874 only 76 genera were recognized for the orders Ophioglossales, Marattiales, and Filicales. Contrasted with these numbers, the above-named writers increased the number of fern genera as follows:

Presl,	232 genera.
John Smith,	220 genera.
Fée,	181 genera (Polypodiaceae, only).
Moore,	176 genera.

Karel Boriwog Presl (1794–1852), a native of Bohemia, commenced publication among the ferns in the *Deliciae Pragenses* (1822) and the *Reliquiae Haenkeanae* (1825 *) in which he described numerous species from Brazil, Mexico, Peru, and the Philippines. Then followed his first publication on genera in his

* The date on the title page of the first volume is 1830, but the work was published in parts, the parts containing the ferns in 1825.

[Vol. 5, No. 2, of Torreya, comprising pages 21–36, was issued February 28. 1905.]

Tentamen Pteridographiae (1836) in which he recognized 116 genera in the Polypodiaceae and Cyatheaceae. This was followed in 1843 by his *Hymenophyllaceae* and in 1845 by his *Supplementum Tentaminis Pteridographiae*, which treated the remaining families. In the former work many new species were described and the *Supplementum* was a monograph of the families Ophioglossaceae, Marattiaceae, Osmundaceae, and Schizaeaceae. His later works were *Die Gefässbündel im Stipes der Farrn* (1847) and *Epimeliae Botanicae* (1849), in which, besides describing many new species, he established 68 additional genera, bringing the total number recognized by him to 232. Presl was among the first to recognize the distribution of the fibro-vascular system both in the stem and in the leaf as having primary importance in the matter of relationship among ferns, and after Robert Brown, was the first really to look upon a genus of ferns as a natural group of closely allied organisms, instead of a loose assemblage of organisms whose superficial and accidental characters brought them under a cut and dried definition based on artificial resemblances.

Such unnatural and unholy alliances as the groups of species still included in *Gymnogramme*, *Acrostichum*, *Polypodium*, and *Davallia* in the *Synopsis Filicum* of Hooker and Baker, were separated by Presl into much more natural groups, and while he made errors, as might be expected in a pioneer, his system is in many respects the most logical single system that has yet appeared.

Presl's collection of ferns is in the botanical museum of the German University of Prague, although some of his types are at Vienna. The collection lies in its original sheets, dust-covered, unmounted, and unmolested. When we visited the collection in 1903 it was even impossible to consult any of Presl's voluminous writings on ferns in connection with his collection, for the simple reason that the extensive botanical laboratory in Prague did not possess them. With the single exception of a solitary note by Al. Braun there was little to show that any one else had ever consulted the collection since Presl's death, and yet the collection, next to those at Kew, Berlin, and Paris, is probably the most im-

portant, abounding in novelties and rich in the types of Presl, for he published no less than four hundred species of pteridophytes.

John Smith (1798–1888) was the curator of the Kew Gardens who built up the splendid collection of living ferns at that establishment. He knew ferns in cultivation better than any man before or since his time, and the genera he established were founded largely on habital characters which in great measure were dependent on the fibro-vascular system, whose importance in taxonomy he also clearly recognized. Besides publishing an enumeration of the ferns of the Philippines, Smith early published an outline of his system of fern classification in *Hooker's Journal of Botany* (**4**: 38–70; 147–198. 1842) and afterwards developed it in his later publications (1) *Cultivated Ferns* (1857), (2) *Ferns British and Foreign* (1866, 2d ed. 1877) and (3) *Historia Filicum* (1875), in which he also reviewed other systems.

Smith's collection is at the British Museum and is interesting as the work of a horticulturist, which like that of a pure morphologist shows underestimation of the value of a herbarium specimen. As Smith described comparatively few species, his collection contains few types.

Antoine Laurent Apollinaire Fée (1789–1874) was professor at Strasbourg so long as that city formed a part of France. His publications on ferns consist mainly (1) of eleven memoirs on ferns, the first four in folio monographing *Antrophyum*, *Vittaria*, and *Acrostichum*; the others are in quarto form and comprise *Genera Filicum* (Memoir 5), descriptions of new species from various parts of the world (memoirs 6, 7, 8, and 10), a list of ferns of Mexico (Memoir 9), and a similar but more pretentious list of the ferns and lycopods of the Antilles (Memoir 11); and (2) *Cryptogames vasculaires du Brésil* (1869), with *Supplement* (1872–73) similarly in quarto and like the memoirs admirably illustrated with lithographic plates. These two series contain a total of 285 quarto or folio plates and illustrate about eight hundred species of ferns.

Fée's collection of ferns once belonged to Dom Pedro II of Brazil, and after the death of that unfortunate monarch became the property of M. Cosson in Paris, in whose admirable herbarium

it is now incorporated. Fée's species are largely valid ones, but his work has been discredited by the Hookerian school mostly without having seen Fée's types. With Paris as near London as Washington is near New York, this condition of affairs is positively inexplicable, and absolutely without excuse.

Thomas Moore (1821–1887) commenced the publication of an admirable *Index Filicum* in 1857–63, which contained his fern system (pp. ix–clxii, *pl. 1–84*), and commenced an alphabetical enumeration of ferns and their synonyms (pp. 1–396). Publication unfortunately stopped in the middle of the letter G. The MSS. of the remainder is preserved at Kew with Moore's extensive herbarium, the latter containing a number of types of species published largely in the Gardeners' Chronicle. Many have asked, Why should this not be published now? There are many reasons, and among them either one of two should decide the question in the negative. (1) Over three thousand species of ferns have been published since Moore's publication ceased. It would therefore contain less than half of the known species of ferns and so would be notoriously incomplete. (2) In Moore's time the idea of type localities had not become so all-important in the matter of systematic study of ferns as it has at the present time. No index can be regarded adequate for modern use that does not give, in addition to its citation, the type locality, *i. e.*, the source from which the species was first described.

This brief series of papers would be incomplete did we not refer to one other distinguished fern student, Georg Heinrich Mettenius, (1823–1866) for many years professor at Leipzig. Besides various enumerations of the ferns of various countries like Colombia and New Caledonia, Mettenius published (1) his *Filices Horti Botanici Lipsiensis* (1856), in which he early outlined his rather conservative classification, as he recognized only 72 genera, and, (2) a series of monographs of various genera: *Phegopteris*, *Cheilanthes*, *Polypodium*, *Aspidium*, and *Asplenium*, in his *Ueber einige Farngattungen.* After the untimely death of Mettenius, Kuhn, another brilliant but short-lived German pteridologist, published the *Reliquiae Mettenianae* (Linnaea, **35**: 385–394. 1868; **36**: 41–169. 1869), in which some species were unfortunately published of

which only imperfect material is in existence, some indeed that Mettenius would certainly never have published on such meager data. Mettenius' collection is now incorporated with the general collection of ferns at Berlin, which is next to Kew the most extensive in the world.

Other centers of interesting fern collections in Europe are those of Copenhagen with Liebmann's Mexican species; Munich, with Martius' Brazilian series; Leipzig, with Kunze's collection; and lastly Madrid with the collection of Cavanilles. Before our fern system has been completed all these and the others discussed in this series of papers must be studied comparatively from the standpoint of type specimens.

OTHER FREAKS OF PEAS

BY IDA CLENDENIN

In the November number of TORREYA, Dr. A. J. Grout speaks of the "queer freaks" one comes across in our large city schools in handling the material used by the botany classes. I want to describe one of these that has recently come to my notice, though it may not be so unusual as the one described by Dr. Grout.

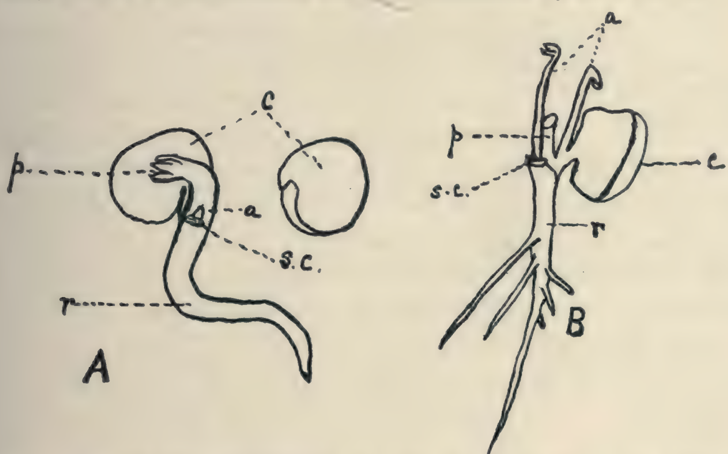


FIG. A. Young seedling, showing bud in axil of cotyledon. *a*, bud in axil of cotyledon; *c*, cotyledon; *p*, plumule; *r*, radicle; *s. c.*, scar of cotyledon.

FIG. B. Young seedling with plumule cut off; shoots from buds in axils of cotyledons.

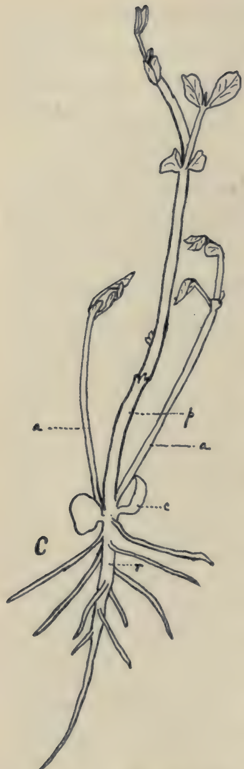


FIG. C. Seedling showing shoots from plumule and from bud in axil of each cotyledon.

In making an experiment last fall to find out the function of the cotyledons of the pea, by placing the radicles of very young seedlings in water, eight or ten girls in my botany classes reported that they had peas with three plumules. When they brought them to class, for inspection, I found that each of these seedlings had the ordinary shoot from the plumule and a shoot from the tiny bud in the axil of each cotyledon. These buds make their appearance at an early stage of germination, whether the peas are germinated in earth or on moist blotting paper, but among the thousands of seedling peas which I have dug up from the germinating boxes in the Girls' High School, I do not remember to have found one in which these buds had developed into shoots except in seedlings whose terminal bud (plumule) had been destroyed. In this emergency, the growth of one or both of these axillary buds is to be expected ; I have often induced it by pinching off the plumules of young seedlings growing with the radicles in water, and it is interesting to note that the shoots from these buds lift themselves in an arch, just as the shoot from the plumule does. So far as my own observations go, the development of shoots from buds in the axils of cotyledons in addition to the shoot from the plumule is rare, and it is difficult to explain why so many seedlings should have shown that tendency the past season.

GIRLS' HIGH SCHOOL, BROOKLYN,
December 27, 1904.

A KEY TO THE STIPITATE POLYPORACEAE OF TEMPERATE NORTH AMERICA—II *

By William A. Murrill

E. The Species of Porodiscus

Plant minute, abundant on twigs of chestnut, oak, etc.; stipe attached to the vertex of the pileus and usually curved at maturity. *P. pendulus* (Schw.) Murrill

F. The Species of Polyporus

1. Stipe pallid or light-brown, not darker than the pileus. 2
   Stipe wholly or partly black or fuliginous, darker than the pileus. 9
2. Margin of pileus not ciliate. 3
   Margin of pileus ornamented with cilia, which often disappear with age; tubes alveolar. 7
3. Pileus trumpet-shaped, deeply infundibuliform. *P. craterellus* B. & C.
   Pileus not trumpet-shaped. 4
4. Surface tomentose, often becoming glabrous. 5
   Surface glabrous from the first. 6
5. Tubes decurrent, very short, entire; pileus dark-purple, with paler radiating lines; known only from Alabama. *P. dibaphus* B. & C.
   Tubes not decidedly decurrent, denticulate when mature; pileus yellowish to smoky-black; common throughout. *P. Polyporus* (Retz) Murrill
6. Context light-brown; tubes decurrent; known only from South Carolina. *P. columbiensis* Berk.
   Context golden-yellow; tubes remote; known only from Ohio. *P. phaeoxanthus* B. & Mont.
7. Pileus very thin, smooth, pellucid; known only from North Carolina. *P. arculariellus* Murrill
   Pileus opaque. 8
8. Pileus less than 1 cm. in diameter, light-gray; stipe setulose; known only from Tennessee. *P. arculariformis* Murrill
   Pileus considerably larger, brown in color; stipe squamulose; common throughout. *P. arcularius* (Batsch) Fr.
9. Pileus squamose, very large, flabelliform; tubes large, alveolar. *P. caudicinus* (Scop.) Murrill
   Pileus glabrous; tubes punctiform. 10
10. Stipe ivory-black below; pileus usually ochraceous, surface scarcely depressed, margin even, not becoming extremely thin. *P. elegans* (Bull.) Fr.
   Stipe smoky-black below; pileus usually chestnut-colored, depressed at the center or behind, margin usually very thin and irregular. *P. fissus* Berk.

G. The Species of Abortiporus

Plant rather common about stumps, usually much aborted and often only a mass of pores. *A. distortus* (Schw.) Murrill

* Continued from p. 30.

H. The Species of Cycloporus

Plant very rare, terrestrial, with central stipe and concentrically furrowed hymenium. *C. Greenei* (Berk.) Murrill

I. The Species of Romellia

Plant abundant, large, spongy, hispid, very destructive to conifers.
R. sistotremoides (Alb. & Schw.) Murrill

J. The Species of Coltricia

1. Pileus concentrically zonate; context thin. 2
   Pileus azonate; context rather thick and spongy. 4
2. Pileus shining cinnamon, strigose, striate, thin, flexible, slightly depressed, the margin often fimbriate or pseudo-ciliate. *C. cinnamomea* (Jacq.) Murrill
   Pileus dull rusty cinnamon to hoary, velvety to glabrous, deeply depressed, the margin thicker and less fimbriate. 3
3. Tubes small, 0.5 mm. or less in diameter. *C. perennis* (L.) Murrill
   Tubes large, 1 mm. in diameter. *C. parvula* (Kl.) Murrill
4. Context homogeneous; hymenium free from spines. 5
   Context duplex, soft above and woody below; hymenium beset with spines.
   C. tomentosa (Fr.) Murrill
5. Pileus ferruginous to fulvous, 5 cm. in diameter, surface finely tomentose; stipe swollen and soft at the base. *C. obesa* (Ell. & Ever.) Murrill
   Pileus darker, fulvous to chocolate-colored, 10 cm. in diameter, surface rough and shaggy; stipe scutate and firm at the base. *C. Memmingeri* Murrill

K. The Species of Coltriciella

Plant minute, pendant, very rare, on decayed pine wood.
C. dependens (B. & C.) Murrill

New York Botanical Garden.

SHORTER NOTES

Jacquinia Curtissii sp. nov. — A low shrub. Leaves linear-lanceolate, 2–3 cm. long, 3–4 mm. wide, attenuate into a mucro 2–3 mm. long, glabrous, the rigid margins revolute; twigs puberulent; inflorescence involucred by minute scales, 3- or 4-flowered; peduncle 3–4 mm. long, less than half as long as the slender spreading or recurved pedicels; calyx campanulate, about 3 mm. long; sepals rounded, entire, eciliate.

Isle of Pines, Cuba, April 24, 1904, *A. H. Curtiss*. Related to *J. stenophylla* Urban, and to *J. brevifolia* Urban, differing from both by its larger flowers with longer pedicels.

N. L. Britton.

New Binomials in an Index. — It may have escaped the notice of botanists that all new varietal or subspecific names

proposed in the Proceedings of the Biological Society of Washington appear in the index as binomials. For examples, in these Proceedings, Vol. XVII, p. 112, I described *Tetraneuris linearifolia Dodgei*, subsp. nov.; in the index, p. 185, it is called *Tetraneuris Dodgei*. On pp. 175 and 178, Professor A. Nelson described *Nemexia herbacea melica* and *Erigeron macranthus mirus*; in the index, pp. 182 and 183, they are *Nemexia melica* and *Erigeron mirus*. This is not done accidentally; I learned through correspondence with Mr. G. S. Miller at the time of the publication of my article, that it was held that what are usually called subspecies should be expressed by binomials, and it was not without protest that I was allowed to publish *T. Dodgei* as a trinomial. While I cannot agree with this view, the position is an intelligible one, and the committee has a right to print the names in any manner it sees fit, in a part of the Proceedings for which the several authors have no responsibility. I take it that the binomials printed as stated must be recognized (in the synonymy or otherwise, according to one's opinion), and should be credited to the publication committee, Messrs. Hay, Miller and White, who may be signified by the symbols H. M. W.

T. D. A. Cockerell.

Boulder, Colorado.

REVIEWS

Flora of Los Angeles and Vicinity*

The great area of California, its many climates and other peculiar environmental conditions, give rise to many different floras in the different parts of the state, so that local floras are greatly desired. The flora of the whole state has been only superficially examined and at the present time a compendium of the complete flora is an impossibility. There yet remain many parts to be explored and many groups of plants are but imperfectly understood. For some years to come collectors and students must work earnestly before such a work can be even planned.

* **Abrams, L. R.** Flora of Los Angeles and Vicinity. 8vo. Pp. xi + 474. Stanford University, Cal., Stanford University Press. 5 Ap 1904.

A popular manual for those students who are satisfied to know the genus to which a plant belongs or who wish only to recognize the great aggregates might be advantageously prepared, but the flora for the real student is yet many years in the future.

In selecting Los Angeles and vicinity as the subject of a local flora, Mr. Abrams has shown discrimination and foresight. His book is the first attempt to classify the plants of that populous and educated center, outside of mere lists of names and localities. The book ought to be much used, but unfortunately he has written it more for the rare scientist than for the numerous amateurs. His adoption of the metric system in a book designed to reach the public will militate against its use. The general public neither knows nor wants to know this system, and many are prejudiced against it because it is foreign. There is not one person in a thousand to whom millimeter, centimeter, etc., convey any idea. This difficulty might be obviated by the introduction of a card showing these dimensions. Reforms that go into the every-day life of an entire people can be only gradually brought about. Those enthusiasts whose ideals lead them to force reforms prematurely have to suffer for their cause.

The book is neatly gotten up in a convenient size, the type and arrangement are good, the families are according to the system of Engler and Prantl, and, in general, the modern American system of nomenclature is used, but not the extreme dividing of families and genera such as prevails in a recent publication. Where changes in generic names occur, the former well-known synonym is always given both in the text and index. In species-making the author has been conservative, especially in some groups that are in great need of revision. In these cases the descriptions are frequently adapted instead of being original. This appears more sensible than giving an original description to a plant whose name is uncertain or to a name where the plant is not distinctly recognized.

Of course it is not possible to include every species within the limits, and so additions will be cropping up all the time. During a brief visit to Pasadena in May I saw *Viola praemorsa* on Mt. Wilson ; *Epipactis gigantea* along a small shady stream a short

distance from Pasadena; *Lithophragma heterophylla* in a shady canyon near Pasadena; *Arabis arcuata* on Mt. Wilson. Mr. George B. Grant reports the following: *Polygonum ramosissimum*, *Tissa rubra*, *Reseda lutea*, *Sphaeralcea Fendleri Californica* Parish, *Lupinus Stiversi* and *L. formosus*, *Corethrogyne filaginifolia*, *Avena barbata*, *Salix sessilifolia Hindsiana*, *Monardella macrantha*, *Lavatera assurgentiflora*, *Lepidium latipes*, and *Euphorbia maculata*. These have all been verified by Parish and others.

It is easy to find fault, but too much praise cannot be given to the painstaking, conscientious care that is evident on every page of the book. Those who use it will scarcely have any idea of the great amount of work that falls to every pioneer in a new field.

ALICE EASTWOOD.

PROSPECTUS OF THE WORK OF THE TORREY BOTANICAL CLUB DURING 1905

The interest of the members and friends of the Club is earnestly solicited in its proposed work for the coming year. During the past decade the Club's scientific work and standing have advanced greatly, placing it among the foremost scientific societies in the world. In the meantime its local work, and the local interest in it and in its proceedings, have not benefited proportionately. In such a society, located in such a community as ours, the number of persons interested as amateurs should be many times greater than that of those professionally interested in botany. The charter and constitution of the Club clearly set forth that one of its principal objects is to extend an interest in botanical subjects, which extension is only possible by leading those not interested to become so. It is hardly to be expected that this interest will be engendered by the presentation alone of the results of abstruse researches in subjects which have as yet developed no popular features. On the other hand, research work almost invariably requires material assistance from without, which can in no other way be so well supplied as by the coöperation of an associated membership. In return for such coöperation, the society should provide matter of instruction and interest of a different character

or grade from that which specially interests its more advanced students. If the Torrey Botanical Club had forced upon it the alternative of relapsing into its old days of dilettanteism, it would probably be justified in preferring a state of dignified semi-starvation; but no such alternative is presented. It is quite practicable for us to enjoy the beauty, grace, and sociability, which characterized the Club's life a dozen years ago, while making this very gain contributory to its higher scientific life. It is toward this object that the various working committees of the Club will direct their efforts during the coming year, and for which they ask the necessary coöperation of the members.

The new home of the Club at the American Museum of Natural History is convenient, commodious and beautifully furnished and equipped, and it is hoped that the members will meet there in large numbers and will discuss with animation the very many and varied botanical interests which the city now affords. Among the interesting features of our afternoon and evening meetings during the coming year will be the following: The results of the critical studies of local plants made during the last decade will be discussed and illustrated. On May 9, there will be a "Violet Evening," when all obtainable forms of violets will be exhibited and discussed, as to identity and habits, and the results of cultivation of native violets at the Botanical Garden will be presented. In October, an evening will be similarly devoted to the study of asters and golden-rods. On both occasions special collections will be made in the different characteristic localities of our local area. Mr. Nash will devote an evening to the exhibition of the principal types of cultivated orchids, and Dr. Britton will similarly discuss Cactaceae at an afternoon meeting to be held in the cactus house of the Garden. An evening meeting will be devoted to a consideration of the trap-rock flora of Essex County N. J. Dr. Small will give an illustrated paper on the mountain flora of the southeastern United States.

The work of the Field Committee will also be conducted in such a way as to provide instruction of a more systematic character than heretofore, and will at the same time be made more interesting. Work upon the local flora will be organized by the

committees having it in charge, and will be largely carried out in connection with the excursions. One of the April excursions will be conducted by Professor Lloyd, with the particular object of illustrating the seasonal adaptations of the earliest spring flowers. A sea-side excursion will be devoted to an illustration of the local types of marine algae, by Dr. Howe. Dr. Murrill will devote an afternoon at Scarsdale, New York, to illustrating the habits of different classes of fungi. In June there will be a "Lupine Excursion" to Pompton, where a large hill entirely covered by this plant will be visited, and where other floral features of great interest and beauty will be enjoyed. On May 6, Professor Underwood will entertain us at Redding, Conn. Dr. Hollick will devote a day to palæobotanical collecting at Glen Cove, and will explain the appearance of the region and its geographical and botanical relations at the time that the plants were living.

Not only are the members requested to participate more freely in the indoor and field-meetings, but they are specially urged to increase the Club's membership. There are hundreds of persons in and about New York who should be members, by virtue of their interest in wild plants or in other botanical subjects, but to whom the Club is unknown. If our members would, at the expense of a very little trouble, seek out such persons and make our objects and proceedings known to them, many would be induced to become members, to their and our mutual advantage. We have met people who had been deterred from seeking membership through a mistaken idea as to the qualifications required or expected, and who promptly presented their applications upon learning that an interest in plants sufficient to make our meetings, excursions, or literature attractive to them constitutes a sufficient qualification to make them welcome as members.

Henry H. Rusby,
President.

PROCEEDINGS OF THE CLUB

Tuesday, January 10, 1905

The annual business meeting was held at the College of Pharmacy, President Brown in the chair and twenty members present.

W. W. Eggleston of the N. Y. Botanical Garden was elected to membership.

Resignations were accepted from Miss Theresa G. Williamson, Miss Nina L. Marshall, Miss Margaret F. Jagger, Mrs. Lillian Howard Perry, Mrs. Millie T. Ries and John P. Conroy.

The annual report of the treasurer showed gross receipts of $2,697.80 for the year and expenditures amounting to $2,226.80.

The report of the recording secretary showed that the club had held twelve regular meetings during the year with an average attendance of 19, and had listened to 23 stated papers.

The report of the editor-in-chief showed that the current volume of the *Bulletin* contained 682 pages and 26 plates besides numerous text-figures. Vol. 13 of the *Memoirs* was reported in press and partially printed.

Verbal reports were received from the editor of Torreya, the corresponding secretary, the chairman of the field committee, and the committee on local flora.

Professor Underwood, chairman of the committee on index cards of current botanical literature submitted a report covering four years and showing receipts of $783.21 and expenses of $643.21. His committee proposed withholding a small reserve fund, and signified the intention of turning over $115.00 to the Club.

The following resolution was presented :

Resolved : That the Torrey Botanical Club, recognizing the importance of preserving natural scenery in public parks, such as would be permanently injured by the proposed railway line through south Bronx Park, heartily joins other organizations in protesting against the construction of such road through Bronx Park.

This resolution was unanimously passed and copies were ordered mailed to the Rapid Transit Commission and the public press.

A letter was read from President Brown declining a reëlection and the following resolution, proposed by Dr. Britton, was put by Vice-President Rusby and unanimously adopted by a rising vote:

Resolved, That the Club receives the letter of its President, ex-Judge Addison Brown, refusing a renomination to that office, with very deep regret, and

Resolved, That the Club hereby expresses its gratitude to Dr. Brown for his valuable services as President during the past fifteen years, and its hope and expectation that he will continue to give the Club the advantage of his wisdom and advice.

The Club then proceeded to the election of officers for the ensuing year.

Nominations were made and upon motion the secretary cast an affirmative ballot for the following: *President*, Henry H. Rusby; *Vice-Presidents*, Edward S. Burgess and L. M. Underwood; *Treasurer*, F. E. Lloyd; *Recording Secretary*, Edward W. Berry; *Corresponding Secretary*, John K. Small; *Editor*, John H. Barnhart; *Associate Editors*, N. L. Britton, Tracy E. Hazen, Marshall A. Howe, D. T. MacDougal, W. A. Murrill, H. M. Richards, and Anna Murray Vail.

A short address of acceptance was made by President-elect Rusby.

The question of changing the place of meeting of the first meeting in each month from the College of Pharmacy to the American Museum of Natural History was introduced and after discussion it was moved that Drs. Rusby and Britton be constituted a committee with power to make such change provided that the expense proved to be trifling.

Edward W. Berry,
Secretary.

TUESDAY, FEBRUARY 14, 1905.

The meeting was held at the American Museum of Natural History, President Rusby in the chair and fifteen members present.

Minutes of the annual meeting were read and approved.

The president appointed the following standing committees and delegates:

Finance, J. I. Kane, C. F. Cox; *Admissions*, E. S. Burgess, Delia W. Marble, John K. Small; *Local Flora*, *Phanerogamia*, N. L. Britton, E. P. Bicknell, Fanny A. Mulford, W. W. Eggleston; *Local Flora*, *Cryptogamia*, L. M. Underwood, M. A. Howe W. A. Murrill, Elizabeth G. Britton; *Program*, N. L. Britton, M. A. Howe, L. M. Underwood; *Field Excursions*, Eugene Smith, Geo. V. Nash, Marie L. Sanial, E. W. Berry, Percy Wilson, H. H. Rusby; *Delegates to the Council of the Scientific Alliance*, H. H. Rusby, N. L. Britton, Addison Brown; *Delegates to the International Botanical Congress at Vienna*, N. L. Britton, L. M. Underwood.

Of the scientific program, the first paper, which was illustrated by lantern slides, was by Dr. George H. Shull, and was entitled "Stages in the Development of *Sium cicutaefolium*." Dr. Shull presented briefly the great range of leaf-form in this species at different stages of growth, concluding that these various stages give no safe indication of ancestral forms.

The life-cycle of *Sium* fits it for the conditions under which it grows at different stages of its growth, it being mesophytic, hydrophytic and xerophytic in turn. This cycle of changes seems to be independent of external conditions and proceeds regularly without regard for the environment. The consideration of a number of rejuvenated buds shows that rejuvenescence may be brought about by submerging senescent buds in water, and that the later the stage of senescence the earlier will be the juvenile forms which are induced to appear. Evidences were presented tending to prove that the proximal leaflets of pinnate leaves are homologous in any series of leaves taken from the same plant and that the other leaflets are likewise homologous counting from the proximal pair.

The paper was the subject of considerable discussion.

The second paper was by Dr. Tracy E. Hazen, on "Recent Advances in the Phylogeny of the Green Algae." The subject was introduced by a sketch of Borzi's group Confervales, now enlarged into the class Heterokontae, comprising genera showing natural affinities, taken from the three old orders Protococcales, Confervales and Siphoneae. This new class, accepted by all

recent investigators, serves to indicate the artificiality of the traditional classification.

The clearer lines of descent of the chief groups of Chlorophyceae from the unicellular, motile *Chlamydomonas* were traced; the first tendency, in the direction of aggregations of motile cells, finding its highest expression in *Volvox;* the second tendency, in the direction of septate cell division, to form non-motile bodies of increasing solidarity, leading through the Tetrasporaceae to the Ulvaceae (which have been placed in a separate order, Ulvales, by some recent authors), and finally, through such forms as *Stichococcus*, to the typical filamentous and branched forms culminating in *Coleochaete.* The third, or Endosphaerine tendency from *Chlamydomonas*, as suggested by Blackman, was held by the speaker to furnish an unsatisfactory origin for the Siphoneae, inasmuch as the endophytic forms associated with *Endosphaera* may be regarded as too specialized in their mode of life at least. It is much more natural to derive the Siphoneae from the septate, multinucleate Cladophoraceae. The latter group may well be regarded as an intermediate order, easily derived from the Ulotrichaceae through such forms as *Hormiscia* (*Urospora*) and *Rhizoclonium.*

The recent proposition of Bohlin and Blackman to regard the Oedogoniaceae as forming a class derived from a separate unicellular ancestor is at least premature, and it does not appear at all impossible that this group may have been derived from a *Ulothrix*-like form as suggested by Oltmanns. The Conjugatae furnish a perplexing problem, but the speaker preferred to regard this group as forming an order of Chlorophyceae rather than as a separate class, in view of present evidence.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

The tenth annual winter meeting of the Vermont Botanical Club was held at Burlington, January 18–19, with President Ezra Brainerd of Middlebury College in the chair. Twenty-two papers

were presented, representing numerous lines of botanical study. The following officers were elected for the ensuing year: President, Ezra Brainerd; vice-president, C. G. Pringle; secretary, Professor L. R. Jones; treasurer, Mrs. Nellie F. Flynn; members to serve with the officers as executive committee, Professor J. W. Votey, Mrs. Sarah K. Lord, and Carlton D. Howe. A committee was appointed to investigate the feasibility of attempting to publish the proceedings and the papers presented before the club. For the summer meeting in July a boat will probably be chartered for a cruise among the islands and along the shore of Lake Champlain.

Dr. and Mrs. W. A. Murrill are spending a month in Cuba, where they are occupied chiefly in making collections of fleshy fungi for the New York Botanical Garden.

Dr. C. Stuart Gager, assistant in the laboratories of the New York Botanical Garden, has been acting professor of botany in Rutgers College, New Brunswick, New Jersey, since January. Dr. Gager will have charge of the botanical instruction in the summer sessions of the New York University.

The Associated Press dispatches announce that Colonel Valery Havard was one of the two American attachés of the Russian army who were captured by the Japanese during the recent battle of Mukden. Dr. Havard is a well-known member of the Torrey Club and is author of several papers relating to American economic plants. He left New York on November 17 under commission to join the Russian army in Manchuria as military medical observer for the United States.

Dr. and Mrs. N. L. Britton and Dr. Marshall A. Howe, of the New York Botanical Garden, and Dr. C. F. Millspaugh of the Field Columbian Museum, Chicago, have returned from a six weeks' collecting expedition to the Bahama Islands. A schooner was chartered at Nassau and visits were made to the Berry Islands, the Great Bahama, and the islands of the Exuma Chain. The collections include living plants, herbarium specimens, and fluid-preserved material, representing about 1,400 collection numbers of spermatophytes and higher cryptogams and about 900 of marine algae.

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April, 1905

SOME NOTEWORTHY STATIONS FOR PINUS PALUSTRIS

By Roland M. Harper

While collecting timber specimens for the Georgia State Museum during the winter of 1903–'04, I had exceptional opportunities for studying the distribution of *Pinus palustris* in the northwestern quarter of that state. Although it has been known for some time that this characteristic tree of the coastal plain is found far inland in Georgia and Alabama, scarcely anything has been published in regard to its exact distribution in Northwest Georgia.*

Consequently I was not a little surprised on ascending Pine Mountain † in Bartow County, about three miles east of Carters-

* The occurrence of long-leaf pine in northwest Georgia must have been known to the white settlers as soon as that part of the state was taken from the Indians, about 70 years ago, but I have found no record of this fact in botanical literature dating back more than 25 years. Professor Sargent in his Catalogue of Forest Trees, published in 1880, says of this tree, "not extending more than 100 miles from the coast," and in his report for the Tenth Census, published four years later, he says "rarely extending beyond 150 miles from the coast." But Dr. Mohr, in a report on the forests of Alabama, published in 1880, vaguely refers to the occurrence of this species on the mountains of that State. (And in his "Timber Pines of the Southern United States" and "Plant Life of Alabama," published many years later, numerous details are given.) In 1883 Messrs. J. L. Campbell and W. H. Ruffner, in a pamphlet entitled "A Physical Survey in Georgia, Alabama and Mississippi, along the line of the Georgia Pacific Railway, embracing the Geology, Topography, Minerals, Soils, Climate, Forests, and Agricultural and Manufacturing Resources of the Country," mention the occurrence of *Pinus palustris* in Polk and Haralson counties and adjacent Alabama. In a book entitled "The Commonwealth of Georgia," published by the State Agricultural Department in 1885, there is a forestry map showing among other things a narrow belt of long-leaf pine entering the state near Tallapoosa and terminating near Kingston. Some car-window observations on this belt by the writer were published a few years ago (Bull. Torrey Club, **28**: 455. 1901).

† Not to be confused with the Pine Mountains of Meriwether and adjoining counties. See Bull. Torrey Club, **30**: 292–294, *f. 3*. 1903.

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ville, on December 10, 1903, to find the long-leaf pine common on its upper slopes. Pine Mountain, it should be explained, is a peak of quartzite rock, about 260 miles from the coast, forming part of the bold escarpment which marks the inland edge of the Metamorphic region and overlooks the broad valleys and low ridges of Palaeozoic rocks to the northwestward. The summit of this mountain, according to the topographic maps of the U. S. Geological Survey, is 1,500 feet above sea-level and about 800 feet above the Etowah River at its southern base. Going up the mountain from the river, *Pinus palustris* is first encountered at about the 1,000-foot contour, and continues the rest of the way up, the tops of some of the trees being less than ten feet below the summit of the mountain. It is principally confined to the southern slope, where it is the predominating tree above the altitude mentioned, and is associated with such plants as *Pteridium aquilinum*, *Pinus echinata*, *Andropogon scoparius*, *A. Virginicus*, *Aletris farinosa*, *Quercus Marylandica*, *Q. Prinus*, *Cracca Virginiana*, *Ceanothus Americanus*, *Viola pedata*, *Dasystoma pectinata*, *Eupatorium album*, *Chrysopsis graminifolia*, *Solidago odora*, *Sericocarpus linifolius*, *Silphium compositum*, *Helianthus divaricatus*, and *Coreopsis major Oemleri*, all but one or two of which are common inhabitants of dry pine-barrens in the coastal plain. (A visit to this place in summer would of course reveal a much larger number of species.) A similar flora is found in the corresponding portions of Alabama, according to Dr. Mohr,* and on the southern slopes of the mountains of southwestern Middle Georgia.†

On the date above mentioned, and again three days later, I had the novel experience of standing in a forest of long-leaf pine while viewing some of the highest mountains in the state, many miles to the northeastward, which were covered with snow at that time. (I could also see Stone Mountain, 42 miles southeast, and many nearer peaks.) Pine Mountain is at present the northeasternmost known station for *Pinus palustris* in the mountain region, and is within 40 miles of the known range of *Pinus*

* Contr. U. S. Nat. Herb. **6** : 59–61. 1901.

† Bull. Torrey Club, **30** : 294. 1903.

Strobus. Some of the long-leaf pines there are over two feet in diameter, and but for their inaccessibility they would probably have been cut long ago.

The distribution of the other pines on the same mountain is of sufficient interest to merit a few remarks in passing. *Pinus Taeda* was seen only on the lower slopes, and did not seem to associate with *P. palustris* at all. (It rarely ascends over 1,000 feet above sea-level in any part of its range.) *P. echinata* ranges a little higher, and associates with *P. palustris* at the latter's lower limit, near the 1,000-foot level. *P. Virginiana* occurs at the summit and nearly all over the northern slope, and associates with *P. palustris* at several places east and west of the summit. I have never seen *Pinus Virginiana* associated with *P. palustris* anywhere else, and their ranges are almost entirely distinct, only overlapping a few miles in Georgia and perhaps in Alabama.

I did not see the long-leaf pine elsewhere in Bartow County, but the following month, January, 1904, I traced it through some of the counties bordering on Alabama, namely, Floyd and Polk in the Palaeozoic region and Haralson and Carroll in the Metamorphic. At the same time I was reliably informed of its occurrence in Chattooga County, which is just north of Floyd and must be the northern limit of this tree in Georgia.

In Floyd County, *Pinus palustris* is frequent on the dry southern slopes of Horseleg Mountain near Rome and Heath Mountain near Coosa (on Upper Silurian strata and about 1,000 feet above sea-level in both cases), and it doubtless grows on other mountains in the same county. On Horseleg Mountain the other three pines mentioned above as occurring in Bartow County are distributed in much the same way as on Pine Mountain, *Pinus Taeda* prevailing at the lower levels and *P. Virginiana* at the higher levels. The mountain long-leaf pine is usually of lower stature than that in the coastal plain, with shorter leaves and shorter more crooked branches, all of which is a natural consequence of the comparative severity of the climate.

In Polk County, where mountains are scarce and the average altitude of the country is about 800 feet, *Pinus palustris* occurs frequently, but nowhere abundantly. Going from Polk County

south into Haralson, one ascends rather abruptly the escarpment (known here as Dugdown Mountain) at the edge of the Metamorphic region, and emerges onto a comparatively level region of considerable elevation. In Haralson County the average altitude is something like 1,300 feet (the extremes about 900 and 1,600), and *Pinus palustris* is very common, though never constituting a majority of the forest growth as it does in the pine-barrens. In Carroll County the general elevation is a little less and this pine not quite so abundant, though some individuals of it are nearly if not quite three feet in diameter.

In these two Middle Georgia counties (Haralson and Carroll) *Pinus Taeda* and *P. echinata* occur commonly with *P. palustris*, or at least at the same altitudes. *P. Virginiana* is not known south of Floyd County.*

A rather remarkable feature of the occurrence of *Pinus palustris* in upper Georgia is its decided preference for high altitudes. In that portion of the state northwest of the Chattahoochee River it is not often seen below 1,000 feet; while in the coastal plain, its normal home, there is very little of it above 400 feet. In the mountains of Alabama it flourishes at even higher altitudes than in Georgia, according to Dr. Mohr,† who found it at nearly 2,000 feet in Talladega County in 1896.

Why this species grows among the mountains at all is a question which has been very little discussed and never satisfactorily answered.‡ Dr. Mohr thought the nature of the soil fully accounted for it, but there are other factors to be taken into consideration. For the present range of *P. palustris* in upper Georgia is not coextensive with any particular type of soil, and there are many places in eastern Middle Georgia which are equally sandy but have no long-leaf pine.

* I should mention here perhaps that the "*Pinus pungens*" which I reported a few years ago as occurring in Northwest Georgia (Bull. Torrey Club, **28**: 462. 1901) was incorrectly identified, and is really *P. Virginiana*. Its appearance in Georgia is so different from that of the scrubby specimens which one sees along the fall-line in Maryland and Virginia that I did not at first recognize it to be the same.

† See his "Timber Pines of the Southern United States" (revised edition), p. 73; also "Plant Life of Alabama," pp. 60, 323.

‡ See in this connection Mr. Kearney's interesting paper in *Science* for November 30, 1900, where he discusses the occurrence of many other coastal plain plants in the mountains of Tennessee and Alabama.

Two or three other theories readily suggest themselves.

First, it might be supposed that the original home of this tree was among the mountains, before the coastal plain assumed its present form or became adapted to the growth of this species. But the fact that it is so much more abundant and widely distributed in the coastal plain than in the mountains makes this supposition improbable.

Again, it will be noticed that it is just in this longitude (85°W.) that the fall-line (east of the Mississippi) bends farthest south, and it is possible that the climate or some combination of causes has created a tension in the range of *Pinus palustris* sufficient to cause it to break through the barrier * here and overflow, as it were, into the Piedmont region and mountains beyond for a distance of over 100 miles. As the limit of its distribution in this region does not coincide with any known geological or climatic line, it is not unlikely that its range was restricted only by the time elapsed since it broke through the fall-line, and it may have been still spreading at the time civilized man appeared on the scene and stopped it.

Another possible explanation is this. In most of the counties from Floyd southward to the fall-line there are frequently found, mostly near streams, considerable areas of unconsolidated deposits believed to be of Pleistocene age, lying unconformably on the older rocks. These indicate that much of this land was submerged beneath the sea in comparatively recent geological times, probably not antedating the appearance of most of our living species of trees. Perhaps *Pinus palustris* and several other species which have a similarly anomalous distribution (*e. g.*, *Quercus lyrata*, *Q. Michauxii*, *Magnolia glauca*, *Ilex glabra*,† *Nyssa uniflora*), retreating before the advance of the Pleistocene sea, found congenial homes among these highlands, with soil suited to their needs, and have therefore remained ever since.

Notwithstanding the abundance of long-leaf pine in the region under consideration, it seems to be very little used for lumber, and not at all for turpentine. A part of the charcoal which is

*See Bull. Torrey Club, **31** : 10. 1904.

†See C. L. Boynton, Biltmore Bot. Stud. **1**: 144. 1902.

made in considerable quantities in Bartow, Floyd, and Polk counties to supply the iron furnaces in the vicinity doubtless comes from this species, but in Haralson and Carroll Counties the only evidence I saw of its being used in any way was a few logs at a small sawmill in Bremen. It is probably not abundant enough in these highlands to make its exploitation profitable at present in competition with the much greater supply in the coastal plain. A great deal of it was doubtless destroyed in clearing the land for agricultural purposes before its timber was as much in demand as it is now.

College Point, New York.

TERMS APPLIED TO THE SURFACE AND SURFACE APPENDAGES OF FUNGI

By William A. Murrill

Glossary of Terms

Abrupt, terminating suddenly.
Aculeate, having prickles.
Aculeolate, having small or few prickles.
Alveolate, deeply pitted like a honeycomb.
Anastomosing, forming a net-work.
Annulate, marked with rings or circular transverse lines.
Anoderm, without a crust or skin.
Appendiculate, decorated with small fragments of the veil; used of the margin.
Applanate, flattened out horizontally.
Appressed, lying close.
Arachnoid, cobwebby; of slender entangled hairs, which are fewer and longer than in *tomentose*. Used chiefly of the veil.
Areolate, marked out into small spaces; reticulate.
Asperate, rough with short stiff hairs or points.
Barbed, bearded, having stiff hairs.
Barbulate, finely bearded.
Bibulous, absorbing moisture.
Bifurcate, forked.
Bossed, umbonate.
Bristly, clothed with stiff short hairs.
Bullate, blistered or puckered.
Byssaceous, byssoid.
Byssoid, filamentous, cobwebby, as in the mycelium. Used chiefly of the margin.
Callose, having hardened spots or warts.
Calvous, bald; destitute of hairs usually present.
Canaliculate, deeply channeled; used chiefly of the stem.
Canescent, gray or whitish from a coating of fine hairs.
Carbonaceous, black and brittle like coal or charcoal.
Carnose, fleshy; soft, but firm.
Cartilaginous, firm and tough like cartilage.
Ceraceous, wax-like.
Chaffy, covered with thin dry scales.
Channeled, having deep longitudinal furrows.
Chartaceous, with the texture of parchment or writing-paper.
Ciliate, fringed with hairs or bristles.

Circinate, arranged in a circle.
Cirrhose, tipped with a wavy thread-like appendage.
Clathrate, latticed.
Colliculose, covered with hillock-like elevations.
Comose, bearing a tuft of hairs.
Compressed, flattened laterally; used chiefly of the stem.
Concave, incurved.
Concentric, having a common center.
Confervoid, consisting of loose filaments.
Confluent, running together, blended into one.
Contorted, twisted, crooked.
Convex, arched.
Coriaceous, of a leathery texture.
Corky, firm and elastic like cork.
Corneous, of a horny texture.
Corrugated, irregularly crumpled in folds or wrinkles.
Cortex, the rind or bark; a substantial outer layer.
Corticate, having a rind or cortex.
Costate, having one or more prominent ribs or veins.
Crenate, furnished with rounded teeth.
Crenulate, minutely crenate.
Cribrate, cribrose.
Cribrose, porose, perforated.
Crustaceous, forming a closely adhering crust or layer.
Dealbate, covered with a very white bloom or powder, as though whitewashed.
Dentate, bearing broad sharp teeth pointing directly outward.
Denticulate, minutely dentate.
Depressed, somewhat sunken at the center.
Determinate, having a distinct outline; used of the margin.
Diaphanous, nearly or quite transparent.
Diffuse, spreading widely, loosely or irregularly; used chiefly of the margin.
Disc, the central portion of the surface of the pileus.
Downy, having a dense covering of short weak hairs.
Dissected, cut deeply into many divisions.
Echinate, furnished with stiff bristles.
Echinulate, minutely spinose; used chiefly of the surface of spores.
Effuse, loosely spreading.
Effused, effuse.
Elastic, returning to its original position when pressed or bent.
Encrusted, covered with a hard skin or crust.
Entire, destitute of teeth or notches.
Erose, having the edge ragged as though torn or bitten.
Eroded, erose.
Evanescent, disappearing at a very early stage.
Even, without elevations or depressions.
Exasperate, covered with short hard points.
Expanded, spread out.
Explanate, spread or flattened out instead of rolled or folded as usual.
Farinose, covered with a white mealy powder.
Fasciated, marked with broad parallel stripes.
Fascicled, growing in close bundles or clusters.
Favose, honey-combed.
Fibrillose, bearing firm loose fibers or threads.
Fibrous, composed entirely or mostly of separable threads.
Filamentous, slender and thread-like.
Fimbriate, fringed with loose slender processes larger than hairs.
Fimbrillate, minutely fringed.
Fissile, capable of being split or divided.
Flaccid, relaxed, wilted, not able to hold up its own weight.
Fleshy, soft, but firm, as in a potato. Neither gelatinous nor cartilaginous.
Flexuose, zigzag, winding.
Floccose, clothed with locks or tufts of soft woolly hairs.
Flocculent, floccose.

Flocculose, minutely floccose.

Foveate, marked with pits or depressions.

Foveolate, marked with small pits or depressions.

Fugacious, fading or falling away in a very short time.

Furfuraceous, covered with soft bran-like scales or scurf.

Gibbous, protuberant or swollen at some definite part.

Glabrate, nearly glabrous, or becoming glabrous.

Glabrescent, slightly glabrous.

Glabrous, free from hair, scales, warts or other appendages; not necessarily smooth or even, but usually so.

Glair, a hyaline viscid substance like the white of an egg.

Glaucous, covered with a whitish bloom.

Glutinous, sticky to the touch.

Granular, composed of or covered with minute grains.

Grooved, somewhat furrowed lengthwise; used chiefly of the stem.

Guttate, discolored with small dots.

Guttulate, apparently sprinkled with small drops of oil or resin.

Gyrate, folded like the surface of the brain, convoluted.

Gyrose, gyrate.

Hirsute, clothed with rather long hairs, coarser than in *pubescent* and not so stiff and erect as in *hispid*.

Hirtellous, slightly hirsute.

Hispid, beset with erect stiff hairs or bristles, either long or short.

Hispidulous, minutely hispid.

Hoary, grayish-white on account of a fine coating of hairs.

Hyalescent, somewhat hyaline.

Hyaline, transparent or translucent.

Hygrometric, readily absorbing and holding moisture.

Hygrophanous, apparently water-soaked; translucent when wet, opaque when dry.

Imbricate, overlapping like the shingles on a roof.

Imbricated, imbricate.

Immarginate, without a distinct edge or border.

Incanescent, somewhat hoary.

Incanous, hoary.

Incised, deeply cut into irregular projecting parts.

Indeterminate, diffuse; used chiefly of the margin.

Indurated, hardened.

Innate, blending with the substance.

Intumescent, swelling up, becoming tumid.

Involute, rolled tightly inward or downward upon itself; the opposite of *revolute.*

Labyrinthine, marked with intricate sinuous lines or grooves.

Laccate, apparently varnished.

Lacerate, divided into irregular segments, as if torn.

Laciniate, deeply cut or slashed into narrow segments, which are larger and more irregular than in fimbriate.

Lacinulate, finely laciniate.

Lacinulose, lacinulate.

Lacunose, pitted with shallow holes, which are larger and less regular than in *alveolate*.

Lanate, woolly.

Latticed, interlacing, with spaces between.

Lax, loose, flaccid.

Ligneous, woody.

Lobate, deeply divided into rounded parts with broad sinuses.

Lobed, lobate.

Lobulate, having small lobes.

Lucid, transparent.

Maculate, spotted.

Maculose, maculate.

Marbled, faintly and irregularly striped or veined.

Membranaceous, membranous.

Membranous, thin, soft and often translucent.

Merismoid, subdivided into small pilei.

Micaceous, covered with glistening particles.

Mucedinous, mould-like.
Mucilaginous, slimy.
Multifid, deeply cleft into many segments.
Muricate, rough with short hard points.
Naked, destitute of the covering usually present.
Nebulose, clouded.
Nodulose, covered with pimples or knots.
Obsolete, suppressed or scarcely apparent.
Obtuse, rounded, blunt.
Opaque, having a dull appearance; neither transparent nor shining.
Osseous, of a bony texture.
Pallescent, somewhat pale.
Pallid, lacking in color; of an indistinct watery or dirty-white color.
Papillate, having minute soft tubercles like those on the tongue.
Papillose, papillate.
Papyraceous, papery.
Patent, spreading; used of the margin.
Pectinate, divided into narrow comb-like teeth.
Pellicle, a thin distinct outer layer or skin; not thick and hard like a crust.
Pelliculose, covered with a pellicle.
Pellucid, translucent.
Penicillate, bordered with fine hairs like those of a camel's-hair brush.
Peridium, the outer layer or covering of a closed fungus fruit-body, like a puff-ball.
Persistent, firmly attached and lasting.
Piliferous, pilose.
Pilose, bearing long soft hairs, more or less erect and separate.
Pitted, marked with small depressions.
Plane, flat.
Plicate, folded lengthwise, as in a fan.
Plicatulate, minutely plicate.
Polished, smooth and shiny.
Porose, pierced with many small, rounded openings.
Premorse, appearing as if bitten off.
Proliferous, producing offshoots.
Pruinose, covered with a whitish powdery bloom as if frosted.
Puberulent, minutely pubescent; having a few short soft hairs.
Pubescent, covered with short soft downy hairs.
Pulveraceous, pulverulent.
Pulverulent, dusty or powdery.
Punctate, having transparent or colored points or dots.
Pustulate, having pimples or blisters, usually somewhat larger than in *papillate*.
Radiant, radiating.
Radiate, radiating.
Radiating, spreading from a common center.
Ramose, bearing branches, usually many in number.
Recurved, bent backward ninety degrees or less.
Reflected, reflexed.
Reflexed, bent backward more than ninety degrees or, if less, bent more abruptly than in recurved.
Repand, wavy; used chiefly of the margin.
Resupinate, reversed, inverted.
Reticulate, marked like a net with meshed fibers.
Revolute, strongly curved or rolled backward or upward; opposite of *involute*.
Rigescent, nearly rigid.
Rigid, firm, stiff, unyielding.
Rimose, marked with numerous clefts or cracks.
Rimulose, minutely rimose.
Rivulose, marked with fine wavy channels or grooves.
Rotund, rounded.
Rugose, wrinkled.
Rugulose, minutely wrinkled.
Satiny, glossy like satin.
Scabrate, scabrous.
Scabrid, slightly scabrous.
Scabridous, somewhat scabrid.
Scabrous, rough with minute hard points or short stiff hairs.
Scaly, covered with scales, which are usually fibrous.

Scariose, scarious.
Scarious, dry and membranous.
Scrobiculate, deeply and irregularly pitted.
Sebaceous, wax-like.
Sericous, silky; covered with fine straight glossy hairs.
Serrate, having sharp teeth pointing forward as in a circular saw.
Serrulate, finely serrate.
Setaceous, setose.
Setigerous, setose.
Setose, beset with bristles.
Setulose, beset with fine bristles.
Shaggy, villose or hirsute.
Silky, covered with close-pressed soft and straight pubescence.
Sinuate, strongly waved; used chiefly of the margin.
Sinuous, curving to the right and left.
Smooth, even, without inequalities. Not necessarily glabrous.
Soft, tender and yielding to the touch.
Spinose, spine-like or having spines.
Squamose, covered with coarse scales.
Squamulose, covered with minute scales.
Squarrose, rough with projecting scales.
Squarrulose, minutely squarrose.
Striate, marked lengthwise with fine lines or ridges.
Striatulate, minutely striate.
Strigose, covered with small bristles.
Strumose, swollen on one side.
Stupose, covered with matted tow-like hairs.
Sub-, a prefix meaning under, beneath, somewhat, or partially.
Suberose, corky.
Subulate, awl-shaped.
Sulcate, marked with one or more conspicuous grooves or furrows.
Tessellate, checkered; marked with little squares like those on a checker-board.
Tessellated, tessellate.
Tomentose, covered with densely matted woolly hairs.
Tomentous, tomentose.
Tomentulose, minutely tomentose.
Tomentum, matted woolly hairs.
Tortuous, turning in various directions.
Tremelloid, gelatinous.
Truncate, abrupt, as though cut off; used chiefly of the margin.
Tuberculose, covered with small irregular pimples.
Tumid, swollen.
Tunicate, covered with a thin separable coat.
Umbilicate, having a small abrupt central depression.
Umbonate, having a rather prominent rounded elevation in the center.
Umbonulate, subumbonate.
Unctuous, having an oily or greasy appearance.
Undulate, waved or uneven near the margin.
Velutinous, velvety.
Velvety, closely and evenly covered with fine erect hairs.
Vernicose, varnished.
Verrucose, covered with wart-like elevations.
Verruculose, minutely verruculose.
Villose, covered with long, weak, nearly straight hairs, which are softer and denser than in *pilose*.
Virgate, streaked.
Viscid, sticky, glutinous.
Vitreous, hyaline, transparent like glass.
Vittate, longitudinally striped or ridged.
Woolly, clothed with long twisted or matted hairs.
Wrinkled, contracted and crumpled.
Zonate, marked with concentric lines or bands of color.
Zoned, zonate.

Synopsis of Terms*

A. General terms applied to the Surface as a whole.
  1. Relating to form.
  2. Relating to texture.
  3. Relating to color due to texture.
B. Terms applied to the Margin in particular.
C. Surface Markings.
  1. Rounded markings.
    a. Dots.
    b. Depressions.
    c. Elevations.
  2. Elongated markings.
    a. Irregular.
    b. Regular.
D. Surface Coverings.
  1. Mucilage.
  2. Powder.
  3. Scales.
  4. Hairs.
    a. Kinds of hairs.
    b. Fine hairs.
    c. Coarse hairs.
    d. Stiff hairs.
  5. Sharp elevations.

A. General Terms Applied to the Surface as a Whole

1. Relating to form :
applanate, *plane*, glabrous, smooth, *even*, depressed, concave, expanded, explanate, contorted, convex, compressed, resupinate, crustaceous.

2. Relating to texture :
mucedinous, confervoid, fibrous, gelatinous, *tremelloid*, soft, waxy, *sebaceous*, *ceraceous*, fleshy, *carnose*, membranous, *membranaceous*, spongy, bibulous, hygrometric, scariose, *scarious*, papery, *papyraceous*, *chartaceous*, crustaceous, carbonaceous, cartilaginous, leathery, *coriaceous*, corky, *subcrose*, woody, *ligneous*, indurated, bony, *osseous*, horny, *corneous*, rigescent, rigid, elastic ; anoderm, tunicate, pelliculose, corticate, encrusted, pellicle, cortex, peridium.

3. Relating to color due to texture :
opaque, pallid, *pallescent*, hygrophanous, polished, unctuous, translucent, *hyalescent*, *pellucid*, hyaline, *diaphanous*, *lucid*, *transparent*, vitreous.

B. Terms Applied to the Margin in Particular

immarginate, truncate, *abrupt*, obtuse, *rotund*, *tumid*, acute, patent, recurved, reflexed, *reflected*, revolute, involute ; undulate, striatulate, striate ; entire, repand, sinuate, determinate, diffuse, *effuse*, *indeterminate*, byssoid, *byssaceous*, penicillate, ciliate, fimbrillate, fimbriate, lacinulate, *lacinulose*, laciniate, pectinate, cirrhose, appendiculate ; serrulate, serrate, denticulate, dentate, crenulate, crenate, erose,

* Words in italic are strictly or practically synonymous with those immediately preceding them.

eroded, *premorse*, lacerate, fissile, lobulate, lobed, *lobate*, incised, dissected, multifid, proliferous, merismoid.

C. Surface Markings

1, Rounded Markings.

a. Dots :

punctate, guttulate, guttate, maculate, *maculose*.

b. Depressions :

umbilicate, pitted, *foveate*, foveolate, alveolate, favose, lacunose, scrobiculate, porose, cribrose, latticed, *clathrate*.

c. Elevations :

papillate, *papillose*, pustulate, tuberculose, verruculose, verrucose, nodulose, colliculose, callose, bullate, intumescent, tumid, gibbous, strumose, subumbonate, *umbonulate*, umbonate, *bossed*.

2. Elongated Markings.

a. Irregular :

sinuous, flexuose, tortuous.

nebulose, marbled, rivulose, rugulose, rugose, *wrinkled*, labyrinthine, corrugated ; rimulose, rimose.

b. Regular :

confluent, anastomosing, radiating, *radiant*, *radiate*, concentric, circinate;

reticulate, *areolate*, tessellate, *tessellated ;* plicatulate, plicate, virgate, vittate, costate ; grooved, channeled, *canaliculate ;* annulate, zonate, *zoned*, fasciated, sulcate, gyrose, *gyrate*.

D. Surface Coverings

1. Mucilage :

viscid, *glutinous*, glairy, slimy, *mucilaginous*, varnished, *vernicose*, *laccate*.

2. Powder :

pruinose, *glaucous*, dealbate, farinose, pulverulent, *pulveraceous*, granular.

3. Scales :

furfuraceous, chaffy, micaceous, squamulose, squamose, *scaly*, imbricate, *imbricated*, squarrulose, squarrose.

4. Hairs.

a. Kinds of hairs :

obsolete, evanescent, fugacious, persistent, appressed, innate, filamentous, arachnoid, flaccid, *lax*, fascicled, ramose.

b. Fine hairs :

glabrate, glabrescent, naked, *calvous*, hoary, *canescent*, *incanous*, *incanescent*, satiny, silky, *sericeous*, puberulent, pubescent, *downy*, velvety, *velutinous*.

c. Coarse hairs :

fibrillose, villose, pilose, *piliferous*, tomentose, *tomentous*, hirtellous, hirsute, shaggy, stupose, woolly, *lanate*, flocculose, floccose, *flocculent*, comose.

d. Stiff hairs :

hispidulous, setulose, barbulate, strigose, bearded, *barbed*, setose, *setigerous*, *setaceous*, *bristly*, hispid, echinate.

5. Sharp elevations :

scabridous, *scabrid*, scabrous, *scabrate*, *asperate*, *exasperate*, *muricate*, aculeolate, aculeate, spinose.

New York Botanical Garden.

EXPERIMENT TO SHOW THAT THE ABSENCE OF LIGHT ALONE WILL PREVENT THE PROCESS OF PHOTOSYNTHESIS

By Cyrus A. King

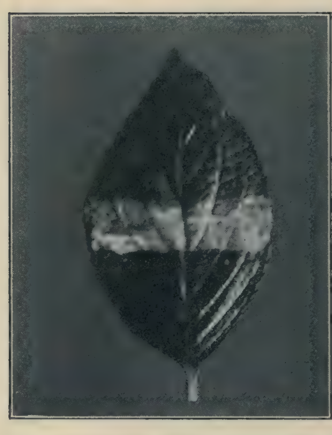
In the *Botanical Gazette* of November, 1903, Bernice L. Haug discusses the question as to whether or not Detmer's experiment to show that light is essential for photosynthesis is reliable, and concludes that it is not.

By means of melted paraffine, she shows that the leaves of *Primula obconica*, even though the plant be in good sunlight, cannot produce starch when the stomata, which are found only on the under surface, are closed. This experiment shows also, as she has pointed out, that CO_2 is not readily diffused through the intercellular spaces of the leaf.

To determine the effect of the cork disks of Detmer's experiments, she cut a circular opening in the upper disk and then fastened the cork ring through the leaf to the disk below. This allowed the light to reach the leaf from above and, at the same time, held the disk below precisely as if the upper disk had been entire. No starch was formed under the cork ring, as one would expect; neither was starch formed in the central portion which was exposed to light. The absence of starch in the latter position must have been due to the fact that CO_2 was cut off by the close-fitting disk on the under surface.

In performing some physiological experiments two of the writer's students, Messrs. R. C. Paris and J. H. Tilley, tried this experiment, using narrow strips of black cloth about as coarse-meshed as cheese-cloth. Through the kindness of Mr. Olsen, Superintendent of the Central Park green houses, the experiments were tried there on several genera. The most pronounced results were obtained from the experiments on hydrangea and rose. The leaf in the accompanying photograph was removed from a hydrangea plant after it had been exposed to the sunlight during the entire day. The black cloth strips used were cut more than twice as long as the width of the leaves and one was wrapped around each leaf near the middle. One pin was used

to fasten the ends of the strips and another was inserted into the leaf to hold the cloth close to the leaf. The photograph, which was taken by Mr. Tilley shows that no starch was formed under the black strips.



PREVENTION OF PHOTOSYNTHESIS IN HYDRANGEA.

It seems perfectly obvious that this experiment is free from the inaccuracy of Detmer's experiment which was pointed out by Miss Haug. The cloth, in many places, was not in contact with the leaves. Even assuming that diffusion did not take place through the meshes of the cloth, there were certain parts under the strips which must have been in conditions essentially similar to those outside the strips, excepting, of course, the factor of light. Since light is the only factor eliminated by the cloth strips, the experiment proves that the absence of light alone will prevent photosynthesis.

DEWITT CLINTON HIGH SCHOOL,
NEW YORK CITY.

BIRDS AND MISTLETOE: A CORRECTION

BY S. B. PARISH

In this journal for July, 1902 (**2** : 105), the writer ventured to question whether the berries of the common mistletoe of his region, *Phoradendron flavescens*, were eaten by birds, and the seeds disseminated by their evacuations. This doubt was suggested by observing the undigested appearance of the seeds so abundantly adhering to twigs and other objects, at the season of ripening. Recently I happened on a note by the late Thomas Meehan, published in the *Botanical Gazette*, for February, 1882 (**7** : 22), in which he expresses the same doubt, but founds it on a different premise. Mr. Meehan says :

"Birds do not seem to use the berries. As they are so viscid that the famous bird-lime is made from some species, it is probable that the very viscidity would prevent the free use of the beak in any attempt to use the seeds. But it is believed that by becoming attached to the feet or feathers of birds, the seeds are widely distributed, and that in this way the plant has all the advantage necessary for distribution in the struggle for life."

Nevertheless, birds do eat the berries of the mistletoe, and do distribute the seeds by their evacuations. The waxwing (*Ampelis cedrorum* Vieill.) and *Phainopepla* (*P. nitens* Swans.) are particularly fond of them. In North American Fauna (**7**: 113. 1863), Dr. A. K. Fisher makes the following record concerning the food of the *Phainopepla* in the Inyo County deserts: "A fine male was secured at the mouth of Surprise Cañon, April 23. Its stomach was filled with the berries of the mistletoe, which is a parasite on the mesquite. Several were seen at Resting Springs, about the middle of February, feeding on the same berries, which appear to be their principal food." The mistletoe here referred to must have been *Phoradendron Californicum* Nutt., which is common in the desert region on *Prosopis juliflora* DC. An ornithological friend informs me that he has shot the waxwing and the *Phainopepla* when they were so gorged with the berries that they extruded in handling.

A careful examination of the deposited seeds will show, in many cases, some sign that they have passed through the stomach of a bird — this is by no means always the case, and when the deposit is fresh, it is easily evident that very little of the viscid coating of the seed has been removed in the passage. It would appear that in digestion only the epidermis and little, if any, of the viscid matter, is utilized. This is a fortunate provision, for were this viscid coating digestible, the seeds would be freed from the very substance which serves to glue them to the bark on which they are to germinate. As it is, the passage through the stomach of the bird serves to remove the non-viscid epidermis, and leaves the sticky coating in a condition for performing its office.

San Bernardino, California.

SHORTER NOTES

The Name Melampodium. — In the Illustrated Flora, 3: 405, we read that *Melampodium*, Greek for black-foot, is without significance. No doubt, however, it refers to the black achenes of the common species, which might be thought to resemble little black feet. These achenes (of the ray florets) are not nearly filled by the ovule, constituting apparently moist chambers similar in function to the bladder-like pods of some Astragalines.

T. D. A. Cockerell.

Boulder, Colorado.

PROCEEDINGS OF THE CLUB

Wednesday, February 22, 1905

This meeting was held at the N. Y. Botanical Garden, Professor L. M. Underwood in the chair and twenty-one members present.

A letter was read from Dr. MacDougal explaining his inability to present his announced paper on "The Origin of Species by Mutation or Saltation."

A contribution to the knowledge of the local flora by Mrs. Livingston and Miss Crane was communicated by Dr. W. A. Murrill and read by Professor Underwood. The authors had worked on the fungi, and had identified 195 species in 82 genera and 17 families, all from Scarsdale, N. Y. The remainder of the program consisted of remarks on the genus *Lycopodium*, being some of the results of the joint labors of Professor F. E. Lloyd and Professor L. M. Underwood, which will soon be published in the *Bulletin*; Professor Lloyd spoke from a morphological standpoint and Professor Underwood from the systematic and general. Professor Lloyd called attention to the diagnostic differences which were brought out by the wet method used for the investigations, differences not distinguishable in dried material. The Lycopods fall naturally into two physiological groups as shown by their morphological characters, dependent upon habit — a radially symmetrical type for those species which are erect or pendent,

and a bilaterally symmetrical type, which may be purely physiological due to a twisting of leaves or stems or to the development of dimorphism in the leaves. Many interesting features were brought out with the aid of blackboard drawings.

Professor Underwood spoke of the number of new species brought to light by recent exploration and comparative study of material from the American tropics. The Lycopods, which in our latitude are inconspicuous and comparatively infrequent, in the tropics occasionally become weeds of large size and great beauty, growing especially in high altitudes; in fact most of the more interesting tropical Pteridophyta are found above the 5,000-foot level. Many specimens were exhibited, some of which admirably contrasted the old and the new methods of collecting herbarium material.

After considerable discussion, adjournment followed.

EDWARD W. BERRY,
Secretary.

TUESDAY, MARCH 14, 1905

The meeting was held at the American Museum of Natural History, President Rusby in the chair and twenty-five additional members present.

The Field Committee presented a formal report for 1904, which was received and filed.

Miss Helen L. Palliser, of Brooklyn, N. Y., was elected an active member.

The first paper on the scientific program was by Dr. N. L. Britton, and was entitled "A Botanical Cruise in the Bahamas."

The speaker had just returned from several weeks' exploration in the Bahamas and gave a general account of the trip.

The numerous islands — there are over 2,700 islands, keys, and projecting rocks — are all of the same general type in that they consist of coral limestone. The group is so scattered, extending for more than four degrees of latitude and somewhat farther from east to west, that there is considerable variation in temperature and rainfall.

A remarkable feature of the islands is the abundant and almost impenetrable thickets growing directly out of the rock; in fact,

there is very little soil except that known as "red land," which occurs in the bottom of sink-holes and locally in swales, and the "white land," formed from the crumbled rock either disintegrated in place or accumulated as sand dunes. These two formations represent practically all the tillable land of the islands. Owing to the porous nature of the material there are no known permanent fresh-water streams although there are a number of salt-water creeks of considerable size. Occasionally there are fresh-water ponds and marshes, mostly of small size. These very local ponds and marshes furnish many of the botanical novelties. Salt-water ponds which rise and fall with the tide are abundant and sometimes of large size.

The Bahamas are very recent geologically, the Bahamian uplift being placed not earlier than the late Tertiary, so that they offer excellent opportunities for the study of plant migration and evolution. The flora is of southern derivation, a large number of the known indigenous species being common to the near-by and older islands of Cuba and Hayti, while many other species are closely related to plants from these islands. The chief agents in the introduction and distribution of the plant population are migratory birds, supplemented by winds and ocean currents. Notwithstanding the geologically short period that the Bahamas have been above the sea, they have witnessed the evolution of numerous species, there being many endemic species known and many more which will be made known as the result of the recent explorations. Many of these, it is believed, will prove to be examples of rapid evolution (mutation).

Dr. Britton's observations were followed by remarks on "Collecting Algae in the Bahamas," by Dr. Marshall A. Howe. The shores of the islands were said to offer a considerable variety of physical conditions and to have a marine flora which is on the whole varied and rich, though apparently less so than that of the Florida Keys. The shore-lines are usually rocky, but there are often stretches of white sand which are nearly destitute of algae. The tide rises and falls ordinarily from one to four feet, but the withering effect of the sunshine is such that few species are found in the strictly littoral zone except under shelving rocks

or where the shore is subject to an almost continuous spraying from the waves. A deeply shaded shelf under a remarkable rock overhang on the Cave Cays of the Exuma Chain furnished some of the most interesting algae obtained on the recent expedition. The so-called creeks constitute good collecting grounds, especially if well exposed to tidal currents, and the roots of the red mangrove, which commonly borders such, always harbor algae of interest, particularly when standing in water that is three feet or more deep at low tide. Nearly all the larger islands have brackish ponds which have a peculiar flora, varying in character with the salinity of the water. Hundreds of square miles in the Bahamian region are occupied by the "banks," on which the water is very shallow, mostly from five to twenty feet deep ; these banks often consist of clean white sand with little visible organic life, yet in many places are found, more or less abundantly, representatives of such genera as *Penicillus*, *Rhipocephalus* and *Udotea*, growing directly out of the sand, and *Microdictyon*, *Gymnosorus*, *Wurdemannia*, *Laurencia*, *Chondria*, *Herposiphonia* and others. attached to sponges, corals, sea-fans, etc. In the winter and spring months, at least, very little is found washed ashore except species of *Sargassum* and their epiphytes.

The speaker remarked upon the desirability of extensive dredging operations in order to complete our knowledge of the marine flora of the Bahamian archipelago. A few characteristic specimens of Bahamian marine algae were exhibited. Special attention was directed to four species of *Penicillus*, viz., *P. capitatus*, *P. dumetosus*, *P. Lamourouxii*, and the recently described *Penicillus pyriformis*. *Rhipocephalus Phoenix* and *R. oblongus*, and various species of *Udotea*, *Avrainvillea* and *Halimeda* were also discussed.

Mrs. Britton, who accompanied the expedition, spoke more particularly of the flora of the island of New Providence, where she spent the time collecting, while the other members of the party were cruising. Several exceedingly fine photographs of the local scenery were exhibited.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Mr. O. F. Cook, of the United States Department of Agriculture, is in Guatemala, working upon various botanical problems of an economic character.

Mr. John F. Cowell, director of the Botanic Garden at Buffalo, N. Y., returned in the latter part of March from a collecting expedition to Panama.

Professor A. D. Selby, botanist of the Ohio Agricultural Experiment Station, Wooster, Ohio, returned early in April from a several months' visit to Europe.

Professor E. C. Jeffrey, of Harvard University, has been awarded from the Elizabeth Thompson Science Fund a grant of $200 "for the study of cupressineous conifers."

Dr. D. T. MacDougal, accompanied by Mr. G. G. Copp, left New York on March 10 to continue his studies of desert vegetation in the lower part of the valley of the Colorado River. He is expected to return late in April.

Colonel Nicolas Pike, a veteran naturalist, known to botanists chiefly by his collections of marine algae in the vicinity of New York, in Portugal, and in Mauritius, died in New York City, on April 11 at the age of eighty-seven years. *Pikea*, a Californian genus of red algae, was named in his honor by Harvey in 1853.

Volume 9 of the Contributions from the United States National Herbarium is an alphabetical annotated list of "The Useful Plants of the Island of Guam, with an introductory account of the natural history of the island, of the character and history of its people, and of their agriculture," written by William Edwin Safford. The volume is well illustrated and contains much of general interest.

Professor Francis E. Lloyd, of the Teachers College, Columbia University, has been awarded a grant of $500 by the Carnegie Institution to further his studies of stomatal action and transpiration in desert plants. He will spend the summer at the Desert

Botanical Laboratory of the Carnegie Institution at Tucson, Arizona, where he will continue the researches which he began there during the summer of 1904.

Popular interest in the study of American trees will be stimulated by the recently published "Manual of the Trees of North America (exclusive of Mexico)" by Charles Sprague Sargent, director of the Arnold Arboretum of Harvard University. The descriptions are accompanied by text-figures. A recent work of more general scope but with special reference to the native and cultivated trees of Great Britain is entitled "Trees: A Handbook of Forest Botany for the Woodlands and the Laboratory" and is written by Professor H. Marshall Ward, of Cambridge University. This is in two small octavo volumes and forms a part of the Cambridge Biological Series.

Under the patronage of the Caroline and Olivia Phelps Stokes Fund of the New York Botanical Garden, the Wild Flower Preservation Society of America has printed on cloth (10 × 12 in.) numerous copies of the following notice: "The Gathering of Wild Flowers and Ferns and the Cutting or Injuring of Any Tree or Shrub, or the Starting of Fires on these Premises, is Strictly Forbidden under Penalty of the Law." Any one desiring to make use of such notices will be supplied with them *gratis* on application to Mrs. N. L. Britton, Secretary of the Wild Flower Preservation Society of America, New York Botanical Garden, Bronx Park, New York City.

An experiment is being made at the New York Botanical Garden in the direction of active coöperation with the nature-study work of the public schools of New York City, the experiment being begun with the children of the "4 B" grade of the Borough of the Bronx. The course consists of three illustrated lectures, supplemented by demonstrations in the museums and greenhouses, and also out of doors, with the cultivated and native plants of the Garden. The first lecture of the series has been given by Dr. Marshall A. Howe, assistant curator; the second will be given by Mr. George V. Nash, head gardener, and the third by Dr. N. L. Britton, director-in-chief, other members of

the Garden staff assisting in the demonstrations. The lectures are delivered to groups of 700 to 800 children, who are afterwards arranged in squads of 40 or 50 for the demonstrations.

Professor Hugo de Vries, whose visit to America last year was such a genuine pleasure to all who met him, has just published a volume of 438 pages on his impressions of America under the title "Naar Californië" illustrated with numerous halftones. He includes chapters on the land and people, fruit culture, new varieties of fruit (with an account of two visits to Luther Burbank), irrigation, and the mountains and flora, ending with "Persoonlijke Herinneringen," giving account of his landing at New York, the commencement exercises at Columbia University, where he received the degree of Doctor of Science, his journey to California by the way of the Desert Laboratory at Tucson, and his return by the northern route including a stop at Chicago where he made the convocation address and received a second honorary doctorate at the University of Chicago. The work is full of botanical observations, as might be expected by those who know its writer personally.

In Bulletin no. 71 of the Bureau of Plant Industry, entitled "Soil Inoculation for Legumes," Dr. George T. Moore brings to the attention of the public another triumph of modern botanical science in its relation to agriculture. It has long been known that certain bacterial organisms living in the roots of leguminous plants and commonly causing tubercles upon them have the power of fixing free nitrogen, which is later taken advantage of by the host plants. Leguminous plants with root-tubercles are not only, as a rule, especially in a sterile soil, much more vigorous than those that are destitute of them, but the soil upon which they grow and decay is thereby enriched in nitrogenous materials as well as in the carbon compounds. Dr. Moore and his associates in the Bureau of Plant Industry have now perfected an inexpensive method of inoculating the soil with the proper microörganism. More than 12,000 tests have been made by practical farmers upon various leguminous crops and in nearly all the states of the Union, and the reports indicate a distinct

success for the method. The processes have been patented by the Department of Agriculture in the name of Dr. Moore in order to protect them for the use of the public.

Invitations and preliminary programs for the International Botanical Congress, meeting in Vienna, June 11–18, 1905, have been distributed. A four weeks' excursion to Illyria has been arranged to take place before the meeting of the Congress, and after the Congress are scheduled excursions to the Austrian coast, to the eastern Alps, and to the Lower Austrian mountains and the valley of the Danube. Shorter excursions in the neighborhood of Vienna have been arranged for the week of the Congress. In addition to the discussion of the nomenclature question, which is to be made a special feature of the convention, papers bearing upon various aspects of botany are to be read, and there will be an exhibition comprising three sections, as follows: (1) Historical, (2) Modern Appliances for Research and Instruction, (3) Horticultural. The American delegates, elected and, according to the rules of Congress, entitled to vote in the deliberations upon the nomenclature question, are, so far as we have learned, the following: Members of the International Nomenclature Commission, *N. L. Britton*, *E. L. Greene*, *B. L. Robinson*, *J. D. Smith;* Delegates from Section G, American Association for the Advancement of Science, *C. R. Barnes*, *H. C. Cowles*, *C. L. Shear;* from the Botanical Society of America, *J. C. Arthur;* from the Society for Plant Morphology and Physiology, *W. G. Farlow;* from U. S. Department of Agriculture, *A. F. Woods;* from the Torrey Botanical Club, *N. L. Britton*, *L. M. Underwood;* from the New York Academy of Sciences, *L. M. Underwood;* from the New York Botanical Garden, *J. H. Barnhart;* the American Academy of Arts and Sciences, the New England Botanical Club, the Boston Society of Natural History, and the Vermont Botanical Club will be represented by *B. L. Robinson.*

The program of the spring lectures at the New York Botanical Garden, to be delivered in the lecture hall of the museum building, Bronx Park, on Saturday afternoons, at 4:30 o'clock, is as follows:

April 29, "The Indian and his Uses for Plants," by Mr. Frederick V. Coville; May 6, "The Pines and their Life History," by Professor Francis E. Lloyd; May 13, "Botanical Aspects of the Deserts of Arizona, California, Sonora and Baja California," by Dr. D. T. MacDougal; May 20, "The Coralline Seaweeds," by Dr. Marshall A. Howe; May 27, "Cuba," by Dr. W. A. Murrill; June 3, "Vegetable Poisons and their Strange Uses," by Dr. H. H. Rusby.

Mr. Harlan Harvey York, who for the past two years has been an assistant in botany in the Ohio State University at Columbus, has been appointed fellow in botany in Columbia University for the year 1905–'06. Mr. York received the degree of B.S. from De Pauw University in 1903.

Vol. 5 No. 5

TORREYA

May, 1905

THE CLASSIFICATION OF LICHENS

By Albert Schneider

Systematists have for a long time awaited the coming of the man with convictions sufficiently strong and insight sufficiently keen to produce order out of the long existing lichen chaos. Individual workers have not been wanting who were ready and willing to propose temporary makeshift systems of classification, which in the light of further scientific research proved inadequate and untenable. Only within very recent years has our knowledge of this group of plants become sufficiently advanced and complete to make possible an attempt at a natural system of classification, or at least a system sufficiently concise to give it equal rank with the systems of other comprehensive plant groups. This was made possible by the epoch-making observations and researches of Schwendener, Bornet, Zukal, Reinke and others. In the Lieferungen of Engler and Prantl's Pflanzenfamilien, devoted to lichens, we have perhaps the first more complete summary of modern lichenology and the first effort at formulating a natural system in accord with recent research. Fünfstück's exposition and discussion of general lichenology in Lieferung 180 is complete, concise and quite impartial. This masterpiece of lichenological literature appeared in 1898 and will remain the standard authority for some years to come. An English translation with annotations and additions issued as a separate volume would prove of great value to English students of lichenology and it is to be hoped that some one will undertake this task at an early date.

The only number (Lieferung) thus far issued on the classification of lichens, by A. Zahlbruckner, did not appear until 1903. While the lichens are treated separately, both by Fünfstück and

[Vol. 5, No. 4, of Torreya, comprising pages 55–78, was issued April 27, 1905.]

Zahlbruckner, they nevertheless place them with fungi, parasitically associated with algae. This is all the more remarkable since Fünfstück very concisely sets forth those morphological, physiological and chemical characteristics of lichens, which clearly indicate their autonomous nature. He refuses to look upon the relationship of fungus and alga as mutually beneficial, and designates it as a special or peculiar form of parasitism ("eine besondere Art von Parasitismus"). It is furthermore a misapprehension of the expression "mutualistic symbiosis" to interpret it as meaning that the several symbionts are equally benefited. The term simply implies that the several symbiotic components are benefited (which is frankly admitted by Fünfstück) but that one may receive the greater return favor or benefit. There are some botanists who refuse to recognize in this wonderful biological relationship anything more than ordinary parasitism. Such a deduction is possible only when the components or symbionts are considered separately and not in their mutual relationship. For example, in like manner it is possible to reach the conclusion that the domestic animal is injuriously affected through the influence of man, or that civilized man himself is merely a parasitized or degenerate form of the ignorant savage. To speak of the algal (gonidial) symbiont as imprisoned and parasitized is as irrational as to speak of the imprisoned and parasitized horse or cow. It is very true, man uses the milk, the hide, the hair, the teeth, the meat, the bones, the hoof, in fact every part of the animal. It does look like a clear case of the most pronounced one-sided parasitism, but the aspect is changed markedly as soon as we consider both animals, the cow and the man, in their mutual relationship. Had it not been for man, the cow would perhaps not exist at all; as it is, millions of these animals enjoy a life of luxury as compared with the life they would be compelled to lead as independent unparasitized wild animals. Who can then say that the relationship is not mutualistic? By analogy the same argument applies to the alga and fungus in the lichen-group, only here we have a true symbiotic relationship. It would be a waste of effort again to present the familiar arguments in favor of lichen autonomy or lichen mutualism. The interested reader is referred to

the work of Fünfstück. I wish to refer to one point only. While it is generally admitted that the lichen components or symbionts may develop and exist independently under artificial conditions, at least up to a certain stage, there is no evidence that such is the case in nature. The statement has been made that the algal symbiont may escape from the thallus and vegetate independently on bark, etc., but it lacks proof. Even though that were the case, the fungal symbiont does not exist independently in nature and hence a lichen is an impossibility without the mutualistic association of alga and fungus. No one has yet succeeded in forming a lichen by associating a true alga (*Cystococcus*) with a true ascomycetous fungus. If this were possible we might reasonably expect spontaneously synthetic lichen formations in nature, which is certainly not the case. Lichens invariably arise from preëxisting lichens. Some authorities state that a fungus may attack nostoc colonies and transform them into collematous lichens but this statement requires verification.

Therefore, without entering into what would merely be useless discussion and repetition, it would appear to the writer that the most plausible and reasonable attitude to take toward lichen classification is to consider them as a distinct class. This is the conclusion reached after a perusal of the more important literature on the subject and a rather careful study of the morphology (gross and minute) and ecology of the more important representatives of this very interesting group of plants.

While the system proposed by Zahlbruckner is undoubtedly the best in existence, there are nevertheless several changes which would appear to be desirable. Fünfstück calls attention to the fact that our knowledge of certain lichen structures, organs, functions, etc., etc., is as yet not well understood owing to the fact that our knowledge of lichen evolution and lichen ecology is very incomplete. This accounts for our indefinite and variable terminology. With few exceptions we know practically nothing of the delimitations of species. While this applies especially to the lower forms, it applies also to some of the higher forms, as, for example, *Usnea barbata*, many of the Parmelias, some of the Cladonias, and others. In consideration of these con-

ditions, it is highly absurd for lichen systematists to enter into lengthy and detailed descriptions of species, varieties, subvarieties and even forms. As Fünfstück states, "Bei der ausserordentlich schwankenden Abgrenzung der Arten bei den verschiedenen Autoren ist es geradezu unmöglich eine sichere Orientierung über die Artenzahl zu gewinnen." His further statement that there are in all probability thus far not more than 4,000 good species known harmonizes with the estimates of several other lichenologists. Contrasting this very fair estimate with the fact that some 20,000 species, varieties and forms are actually described it is very evident that there lies an enormous task before those who will attempt to balance this difference. Special care will be necessary in the study and revision of the lower groups. For example, over 100 species, varieties and forms of *Verrucaria* are described. It is more than likely that there are not half that number of good species. This applies also to the genus *Arthonia* as well as to other genera. It may be advisable in some instances to subdivide certain genera. It would appear that Zahlbruckner gives too much systematic importance to the thecial characters, which is however to be expected from one who recognizes the lichens as modified fungi. Too much systematic importance is ascribed to the pycnoconidial apparatus (spermogonia), since the function and occurrence of this organ or structure is but little understood. In brief the subject of lichen classification, as understood at the present time may be summarized as follows :

1. While some authorities are satisfied that lichens deserve to be recognized as an autonomous group, others are not ready to admit this. This difference of opinion does not cause any serious confusion in the conception of lichen groups and species.

2. There is great confusion with regard to the delimitation of lichen species. The number of good species is in all probability less than one fifth of those actually described.

3. The system of classification proposed by Zahlbruckner is excellent and should be generally adopted. This would very materially facilitate the work of studying the various groups more carefully, thus perfecting our knowledge of lichens more and more and making it possible to form a more perfect system in the near future.

California College of Pharmacy, San Francisco.

THE COURSE OF THE POLLEN TUBE IN HOUSTONIA: A PRELIMINARY NOTE

By Francis E. Lloyd

In 1902* I announced that in certain Rubiaceae, namely in the genus *Houstonia*, the ovule is not supplied with an integument, realizing the "*nucellus nudus*" of Schleiden, a condition supposed erroneously by him to obtain in the Rubiaceae in general. At present *Houstonia* is the only genus of this family in which this peculiar and unexpected condition has been announced to occur, although it has recently been found by me that other genera closely allied to *Houstonia* are similar to it in this regard. In the paper above cited it was also shown that the course of the pollen tube in other Rubiaceous genera, namely *Richardsonia* and *Diodia*, is also of especial interest. In *Richardsonia pilosa*, the species studied, the pollen tube takes an intercellular course, the path being constant in its direction. This is true also of *Diodia teres*. *D. Virginiana*, on the other hand, offers a contrast in that for a part of the path the tube moves freely in the ovarian cavity, though in a direction in general similar to that in the other species studied. The significance of this remarkable dissimilarity I have discussed elsewhere † but it may be added that similar relations have been observed by Longo in an entirely different group of plants, the Cucurbitaceae.

The fact that the pollen tube in some of the Rubiaceae is intercellular in its mode of growth, coupled with the further fact that in *Houstonia* no micropyle is present, a condition due of course to the absence of the integument, led me to the belief that the course of the pollen tube in the latter also would be found upon examination to be intercellular. This hypothesis was strengthened again by the similarity of the topography of the ovary in *Richardsonia*, *Diodia*, and *Houstonia*, apart from the placental structure, together with the disposition of the ovules in the last named.

* Lloyd, F. E. The Comparative Embryology of the Rubiaceae. Memoirs of the Torrey Botanical Club, **8**: 27–112. *pl. 5–15.* 15 F 1902.

† The Pollen Tube in the Cucurbitaceae and Rubiaceae. Torreya, **4** : 86–91. Je 1904. Pertinent literature is here cited.

Accordingly, at my suggestion, Mr. Chester A. Mathewson undertook an examination of a lot of material which I had previously collected for the purpose, and has been able to follow the pollen tube from the papillae to the funicle of the ovule. A full account of Mr. Mathewson's observations will appear later when the work is completed. At the present it is of interest to point out that the expectation entertained by me has proved correct and that the course of the pollen tube is throughout intercellular. Through the stylar tissue and the stylar elements of the ovarian partition the tube moves precisely as described for *Richardsonia* and *Diodia*. At the lower edge of the stylar tissue the tube encounters the basal portion of the dissepiment. It then turns abruptly, pursuing a path at right angles, roughly speaking, to its previous course, but for only a short distance. It may turn out that this is not invariably the case, though it is certainly the rule, in which event the tube would penetrate into the tissue of the basal element of the partition directly. Before emerging into the ovule, as it would if it kept on in the direction described, namely at right angles to its stylar course, it turns again abruptly, penetrating from one to several layers deep, gradually turning so as to pursue a path parallel to the axis of the placental stalk. Through the parenchymatous mass of the placenta the path is less direct, but in the main leads with little irregularity to one or another of the ovules. On reaching one of these, the tube may emerge into the sinus between the ovule and the placenta and then repenetrate the ovule laterally ; or, as I believe to be the more usual, the tube enters the ovule through the funicle. From this point it goes more or less obliquely and irregularly toward the egg pole of the embryo-sac, at least in the few cases in which the course has been followed. It will be of further interest to see if in any instances the course is through the chalazal tissues.

A further question presents itself. As is well known, *Houstonia* produces a goodly number of ovules in each of the two locules. These are distributed upon the knob-shaped placentae, which originate in a manner similar to the single ovules of the Galieae and in a similar position. It seems not unlikely that these ovules develop centrifugally, the ones placed nearest the

stylar partition maturing the embryo-sac somewhat earlier than those next in position, and these in turn earlier than the following and so on. If this should turn out to be the case, certain ovules should be first prepared to attract the entering pollen tubes on the theory that the direction of these is determined by the presence of a stimulant which works chemotactically upon them, a view advanced by Molisch and supported by my studies of the Rubiaceae upon physiological-anatomical grounds. This inference would have to be made in view of the fact that there appears to be no special conductive tissue within the placental parenchyma for the guidance of the tubes which, as above pointed out, travel through it.

The facts thus made out serve to emphasize the contention advanced by Murbeck, Longo and myself, to the effect that the phenomena observed in the behavior of the pollen tube in the various plants examined by us have a physiological meaning only. This view is opposed to that which was previously advanced by Treub and by Nawaschin, who ascribed rather a phylogenetic significance to the matter. The fact that in widely different families, including the Rosaceae, Cucurbitaceae, and Rubiaceae, as well as the so-called primitive dicotyledons, similar behaviors of the pollen tube have been observed, loosens the grasp of those who hope upon these grounds to construct a phylogeny of plants of even the most general kind.

CONTRIBUTIONS TO THE RECORDED FUNGUS AND SLIME-MOULD FLORA OF LONG ISLAND

By G. A. Reichling

A list is given below, comprising a few additions to Dr. Jelliffe's Flora of Long Island in the fungi and myxomycetes. The specimens have been collected for the most part at Jamaica and Flushing during last summer. Flushing seems to have a particularly rich and interesting flora.

In the list the nomenclature of Macbride is employed for the myxomycetes. The localities are given with the names.

Myxomycetes

Tilmadoche polycephala (Schw.) Macbr. Near Sheepshead Bay.

Mucilago spongiosa (Leyss.) Morg. Flushing.

Comatricha laxa Rost. Flushing.

Oligonema nitens (Lib.) Rost. Flushing.

FUNGI

Phycomycetes

Empusa Muscae Cohn. Brooklyn.

Ascomycetes

Guignardia Bidwellii (Ell.) V. & R. Near St. Albans.

Basidiomycetes

Amanitopsis vaginata (Bull.) Roze. Near St. Albans.

Omphalia campanella Batsch. Near Flushing.

Russula atropurpurea Peck. Near Flushing.

Pluteus cervinus (Schäff.) Fr. Brooklyn, Flushing.

Galera tenera Schäff. Vandeveer Park, Flatbush.

Pholiota adiposa Fr. Brooklyn.

Psilocybe foenisecii Pers. Brooklyn.

Hypholoma capnoides Fr. Forest Park, Jamaica.

Hypholoma sublateritium Schw. Rockaway Junction.

Panaeolus campanulatus L. Brooklyn.

Strobilomyces floccopus Vahl. Flushing.

Daedalea confragosa (Bolt.) Pers. Flushing, Jamaica, etc., common.

Ganoderma Tsugae Murrill. Jamaica, Rockaway Junction.

Polyporus picipes Fr. Forest Park, Jamaica.

The writer wishes to acknowledge the kindness of Prof. T. H. Macbride, of the State University of Iowa, for determining a slime-mould (*Comatricha laxa* Rost.) and verifying two other determinations. The specimens of the slime-moulds were meager and in a particularly bad condition making the determination a matter of difficulty. *Strobilomyces floccopus* Vahl agrees with the description given in Peck's *Boleti* and Saccardo's *Sylloge*, but it is probable that the species is not distinct from *S. strobilaceus* Berk., in

the United States at least. This opinion is expressed by Professor Peck in *Boleti*, p. 159. Nearly all the fungi and slime moulds given are common species and have probably been collected by others who have studied the mycologic flora of our island.

127 PUTNAM AVENUE,
BROOKLYN, NEW YORK.

SHORTER NOTES

THREE COTYLEDONS IN JUGLANS. — A whorl of three cotyledons has been recorded in a great variety of dicotyledons. Braun (1869) mentions a considerable number of such cases, Masters (1869) records nine different genera in which this abnormality occurs, and many other references are scattered through botanical literature.

During the last winter I ran across a nut of the so-called English walnut (*Juglans regia* L.) which was perfectly three-valved and which contained an embryo with three, apparently normal, cotyledons.

EDWARD W. BERRY.
PASSAIC, NEW JERSEY.

A NEW ROSELLINIA FROM NICARAGUA — **Rosellinia Bakeri** sp. nov. Perithecia scattered or collected in groups of 3–6, touching each other but not confluent, or in short series of 3 or 4, globose, slightly roughened, except the small, papilliform, black ostiolum, base slightly sunk in the wood, about 0.5 mm. in diameter: asci cylindrical, short-stipitate, spore-bearing part 55–65 μ $\times$ 7–8 μ: sporidia uniseriate, acutely elliptical, more so at one end, subinaequilateral and slightly compressed, 8–10 μ $\times$ 4–4.5 μ or 3–3.5 μ when viewed edgewise.

On *Urera*, Chinandega, Nicaragua, December, 1903 (*C. F. Baker, 3990*).

R. compressa E. & D. has smaller perithecia and larger sporidia.

J. B. ELLIS.
NEWFIELD, NEW JERSEY.

A MUCH-NAMED FERN — One ordinarily looks for carelessness of citation as a feature of the systematic (or unsystematic?) botany of the early years of the nineteenth century rather than of

the present period. Redescription of species and unwarranted changes in names, also, were characteristic of the writers of a century ago. But in these recent days we sometimes receive rude shocks from our German friends who occasionally display unexpected unfamiliarity with standard American literature as well as unwarranted laxity of principles in the matter of shifting plant names, all resulting in unnecessary synonymy.

A little Bolivian fern collected by Bang was described just a decade ago by Mrs. Britton as *Acrostichum Moorei*, following the then current interpretation of *Acrostichum* in the wide sense in which it is still employed at Kew. This appeared in our MEMOIRS which ought to be accessible to German writers on ferns, if not in the original then surely in at least two reviews that have appeared in standard German publications, *viz.:* Just's *Bot. Jahresbericht*, **23**: 433. 1897, and *Hedwigia*, **34**: (109). 1895, the latter also "redigiert von Prof. Georg Hieronymus!", and both of which mention this species by name, author, collector, and type locality!

In spite of this, the fern was destined to be redescribed under two new generic and two new specific names, and after American intervention had called attention to the error, and the original specific name had been restored, the latest emanation from Berlin overlooks all of this citation, redescription and restoration and boldly places the plant in its fourth (and correct!) genus but with its third (and most recent) specific name! And all this is German systematic (?) botany of the twentieth century instead of the nineteenth, where it would not so much surprise us!

The following corrected synonymy gives the details of the story:

Microstaphyla Moorei (E. G. Britton)

Acrostichum Moorei E. G. Britton, Mem. Torrey Club, **4**: 273. 1895. (Type from Bolivia, *Bang 558*).

Rhipidopteris Rusbyi Christ, Farnkr. der Erde, 46. 1897. (Type from Bolivia, *Bang 558!*).

Elaphoglossum Bangii Christ, Monog. Elaphoglossum, 99. 1899. (Type from Bolivia, *Bang 558!*).

Elaphoglossum (*Microstaphyla*) *Bangii* Christ, Bull. Herb. Boiss. II. **1**: 588. 1901.

Elaphoglossum Moorei (E. G. Britton) Christ, Bull. Herb. Boiss. II. **3**: 148. 1903.

Microstaphyla Bangii (Christ) Hieron. Bot. Jahrb. Engler, **34**: 539. 1904.

It is to be hoped that after this tedious experience the poor fern will rest in peace!

LUCIEN M. UNDERWOOD.

COLUMBIA UNIVERSITY,
20 April, 1905.

REVIEWS

Species and Varieties; Their Origin by Mutation*

To write two similarly comprehensive works upon the same subject, treated from the same point of view, and not displace the first by the second, nor make the second superfluous is a problem of no small magnitude. In presenting a second work on the mutation theory, Professor Hugo de Vries has solved this problem in a most admirable fashion.

"Species and Varieties: Their Origin by Mutation" is in no sense a rendering into English, of "Die Mutationstheorie," and is much more valuable in many respects than such translation could be made. The author was doubtless greatly aided in the successful solution of the problem by the difference of origin of the two works. "Die Mutationstheorie" is primarily a detailed exposition of the results of research, and was addressed to scientists who would appreciate — nay, demand — all the evidence on which are based the far-reaching generalizations involved in the theory of mutation. "Species and Varieties," on the other hand, having grown out of a series of lectures delivered by the author, before the students of a university, assumes in consequence a much less rigid scientific aspect, becoming by necessity intelligible to a wider circle of readers. A technical scientific work may be pored over by those immediately interested in its subject matter until all its important details are comprehended; but the successful lecturer must make himself instantly intelligible to his audience.

* **De Vries, H.** Species and Varieties: Their Origin by Mutation. Edited by D. T. MacDougal. 8vo, pp. xii + 847. Chicago: The Open Court Publishing Co. F 1905.

The unusual simplicity, directness and beauty of the language used, the purity of its Anglo-Saxon English, in connection with the largeness of its theme, renders the new book at once a classic, and although "Die Mutationstheorie" must always stand as the *epoch-making* work, it is "Species and Varieties" that will be found most frequently back to back with Darwin's "Origin of Species" on the shelves of the general libraries, and that will make the name of de Vries known as Darwin's is to every man and woman of intelligence regardless of vocation.

As compared with "Die Mutationstheorie," the new book shows many evidences that the author has profited by the discussions which have been aroused by that work, and he has very carefully defined his position in regard to points in which he has been misconstrued. Ardent Darwinians immediately attacked the new theory because it appeared to be offered as a substitute for the theory of "Natural Selection." In evident response to these attacks, the author has joined his views in a masterful way to those of Darwin, showing that there is no conflict, and making the reader feel that the theory of mutation was the next step logically, as it certainly has been the next important step historically in the development of a satisfactory conception of the origin of specific and varietal differences.

The basis of the author's views is the conception of character-units as the ultimate bearers of heredity, a conception that, though seemingly too simple and inelastic to be entirely satisfying to the physiologist, has been brought into the greatest prominence and furnished support amounting at least to partial demonstration in the work of Mendel and of those who have since confirmed and extended Mendel's results, in the renaissance and extension of which Professor de Vries himself had such prominent part.

Recognizing as did Darwin that by far the greater part of our knowledge of evolutionary processes is necessarily based upon the results of economic practice, Professor de Vries has made a careful experimental analysis of horticultural and agricultural processes, and it is this part of his work which commends itself especially to the thinking scientist.

By showing that the years devoted by the horticulturist to "fixing" new garden varieties have for their purpose the elimination of the effects of "vicinism," *i. e.*, the chance crosses with neighboring species or varieties, and by distinguishing between ever-sporting varieties and those which possess only an ordinary degree of fluctuating variability, the way has been cleared for a proper appreciation of the true relations between the garden and nature. It is doubtful however whether physiologists will agree that the cases of "double adaptations" in nature, and the relation of juvenile to adult leaf-characters, are to be classed with the ever-sporting varieties of the garden, for in the former cases definite laws of occurrence of the alternative characters are discernible, while in the ever-sporting varieties no such laws have yet been detected and they seem in many instances to be closely related to fluctuating variations.

The book is divided into six sections. After an introductory lecture on the theories of evolution and methods of investigation, the conception of elementary species as distinct from systematic species is developed, and a definite and distinctive significance is attached to the term, "variety," which is quite different from its usually loose usage for any assemblage of forms less extensive than the systematic species. A variety as conceived by de Vries is not qualitatively like a species, being distinguished from the species to which it belongs and from which it has been derived in the possession or lack of some single definite character, or two or three single characters at most while species differ from one another in almost every character. The several different kinds of varieties, progressive, retrogressive, degressive, and ever-sporting, are thoroughly considered, along with the included subjects of latency and atavism.

The fifth section deals with mutations, the evening-primroses naturally having an important place, but the number of other fully authenticated cases described will doubtless give surprise to some readers who may have thought that the mutation theory rests only on the behavior of *Onagra Lamarckiana*.

The last section is devoted to individual and partial variability or "fluctuation" as it is called. This process, which has been

held by Wallace and the "Neo-Darwinians" as practically the only source of evolutionary changes, is held by Professor de Vries to have no effect whatever in giving rise to new specific and varietal distinctions, though it is of great importance both in nature and in culture, in that it allows a certain amount of adaptive change or amelioration within the species.

The editor professes to have changed as little as possible the original diction of the author, and for this the reader will be grateful both because it leaves unmodified the simple, genial flavor of the author's personality and because no material change is conceivable which would not have resulted in a more involved style. Some changes might have been introduced, however, which would have been distinct improvements, and it is to be hoped that in succeeding editions these changes will be made. Thus the description of the zygomorphic or bilateral flowers of *Digitalis* as "symmetrical" is using in an unusual though literally correct sense a word that has long been in use in descriptive botany with a totally different meaning. Another even less desirable practice of quite similar character is the interchangeable use of "retrogression" and "regression" for the mutative loss of a character. "Retrogression" was the term first applied by the author to this process and there is no reason why it should not be used exclusively in biological terminology in this very definite sense. "Regression" already has a distinctive significance in connection with "fluctuation" and is used in its proper sense in Section F. which is devoted to that subject. Much confusion will be avoided if in future editions "retrogression" be substituted for "regression" wherever the mutative loss of a character is intended. An added complication in this connection is found on page 221, where, presumably by a typographical error, "degressive evolution" is rendered "regressive evolution." A number of other typographical errors occur, but in most cases the context prevents misinterpretation. Aside from these the press-work leaves little to be desired.

The year 1904 will always be memorable in the annals of American science because of the number of distinguished foreign scientists who visited this country during that summer. Of these

none was received with more genuine appreciation and honor than Professor de Vries. No more fitting memorial of his summer in America could have been left to his delighted hosts than this series of charming lectures on the most fundamental problems of biology, and one may safely predict that the work will further stimulate the interest that has awakened everywhere in experimental research in variation and heredity, the two fundamental processes of organic evolution.

GEORGE HARRISON SHULL.

STATION FOR EXPERIMENTAL EVOLUTION,
COLD SPRING HARBOR, NEW YORK,
April, 1905.

PROCEEDINGS OF THE CLUB

WEDNESDAY, MARCH 29, 1905

This meeting was held at the New York Botanical Garden, Vice-President Underwood in the chair and twenty-three additional members present.

Mrs. L. Schöney, of New York, and Miss Caroline S. Romer, of Newark, were elected to membership. The scientific program consisted of "Remarks on Californian Conifers" by Le Roy Abrams.

The conifers of California have been of extreme interest to the botanical world from the time that that region was first explored. Nowhere do we find such unique trees as the sequoias, and nowhere is there such a profusion of genera and species. Nearly two thirds of the species of the United States, and all but two of the genera occur within the state. The distribution of these species, especially of some of the more local ones, is of considerable interest, and it was upon this subject that Mr. Abrams chiefly dwelt.

By far the greater number of species occur in the extreme northern part of the state. Here, within a radius scarcely exceeding one hundred miles no less than eleven genera and at least thirty species may be met with. This great profusion is

due mainly to the fact that we have in this region a mingling of the typical Californian species with those of the Northwest.

Nearly all of the local species are confined to the coastal region. Some of these, such as *Pinus Torreyana*, *Abies venusta* and *Cupressus macrocarpa* are extremely local. This peculiar distribution along the coast is of great interest and suggests a field for investigation which is full of possibilities. Mr. Abrams was of the opinion that present climatic conditions together with the broken and unconnected mountains were no doubt largely responsible for the present status of distribution. He suggested that the great changes in land areas to which this region has been subjected during very recent geological time must have had much to do with shaping the destiny of the flora.

EDWARD W. BERRY,
Secretary.

TUESDAY, APRIL 11, 1905

The meeting was held at the American Museum of Natural History, President Rusby in the chair and twenty-two additional members present. Miss Mary Price and Dr. Grace E. Cooley, both of the Newark High School, were elected to membership. The paper of the evening was on "Some Edible Seaweeds" by Professor H. M. Richards.

After reference to the indirect importance of plankton organisms as a source of food for animal life in the sea, the speaker referred to those forms of algae which are used directly by man as food-stuffs. They were grouped roughly under four heads: blue-green, grass-green, brown, and red algae.

In the first group, specimens were shown of a form, which is according to good authority *Nostoc commune flagelliforme*. This becomes highly gelatinous when soaked in warm water and is used as a thickening or sauce. It is much prized by the Chinese. A Japanese form, "Su-zen-ji-nori," of more doubtful nature, but probably an *Aphanothece*, was also shown.

Among the grass-green forms, mention was made of various species of *Ulva* and *Enteromorpha*, which in dried form go under the name of "laver" in the British isles and "ao-nori" among the Japanese. Among the brown forms, only one of the Fucaceae

was mentioned as an article of food, namely *Durvillæa utilis*, which is said to be eaten by the natives in certain parts of Chili.

The Laminaria forms, however, include a large number of edible species. *Alaria esculenta*, common both here and in Europe, was at one time eaten occasionally in the Occident. At the present time the Japanese and Chinese make great use of these forms, indeed, after fish, they constitute the chief article of export of the Hokkaido. They are exceedingly plentiful in that region and their collection and preparation for market is a thriving business.

In this connection, the report of Professor Miyabe and others was passed around and attention was called to the illustrations showing the mode of harvesting the seaweeds. The two most important species seem to be *Laminaria saccharina* (*Laminaria japonica*) and *Undaria pinnatifida* (perhaps identical with *Undaria distans* more recently separated by Miyabe and Okamura) which are known under the respective names of "Kombu" and "Wakame" by the Japanese. Many other forms are eaten however. After reference to the well-known examples "Irish moss" (*Chondrus crispus*) and "dulse," it was said that the two types most used are the delicate *Porphyra* forms and the more massive cartilaginous kinds such as various *Gigartina*, *Gelidium*, *Gloiopeltis* species. *Porphyra* has also been eaten by Europeans and is said to be used by the natives in parts of Alaska, but it is most highly prized by the Japanese and Chinese. Under the name of "Asakusa-nori" it is put up in neat tin boxes and largely sold in the Tokio markets. It is used by itself or for thickening, giving a very glutinous mixture with hot water. "Fu-nori," used chiefly as we use starch, is a mixture of species of *Gloiopeltis* and *Endotrichia*, and like all these forms is sold dried. The speaker referred to agar-agar, which on Wiesner's authority is said to come from different species in different regions. That of Ceylon is from *Gracilaria lichenoides*, that of Java from *Eucheuma spinosum*, while the Japanese variety is furnished by *Gelidium corneum* and *cartilagineum*, and *Gloiopeltis tenax*. Agar, in addition to its uses as a culture medium in bacteriological research, is said to be employed sometimes, as an adulterant in the jellies of commerce, where it may be recog-

nized by the siliceous frustules of diatoms, etc., from which it is never free. Other forms of Florideae are used as food-stuffs, attention being called to their figures in a Japanese popular work on the useful plants of Japan. In regard to the food value of algae it appears that many of them, especially the blue-green forms, contain a very high percentage of proteids, though not much else of value. The gelatinifying substances obtained from the red forms appear to be a substance called gelose, which is similar to, or identical with, the pectic substances so commonly found, either deposited in the middle lamellae of the cells of higher plants, or in the walls themselves. Mention was incidentally made of the use of seaweeds in the manufacture of iodine and soda-ash.

Dr. Rusby exhibited specimens of *Fucus vesiculosus* and an unnamed species of the same genus, which are used medicinally.

Dr. Howe spoke of dulse as an article of food and of its occurrence in the markets of New York.

After further discussion, adjournment followed.

L. H. LIGHTHIPE,
Sec. pro tem.

NEWS ITEMS

Professor L. M. Underwood sailed for Antwerp on May 20. He will spend a large part of the summer at Berlin and Kew.

Mr. L. J. K. Brace, of Nassau, New Providence, Bahamas, is making collections in the western part of the Great Bahama for the New York Botanical Garden.

The fifth annual exhibition of the Horticultural Society of New York was held at the New York Botanical Garden on May 10 and 11. Prizes amounting to about $500 were offered.

Dr. John Hendley Barnhart sailed for Europe on May 13 to attend the International Botanical Congress at Vienna. During the two or three months of his absence, the editor of TORREYA will have charge of editorial matters relating to the *Bulletin of the Torrey Botanical Club.*

The first Walker prize, of $75, has been awarded by the Boston Society of Natural History to Dr. W. B. MacCallum, of the

department of botany of the University of Chicago, the subject of his paper being "Physiological Analysis of the Phenomena of Regeneration of Plants."

Mr. Le Roy Abrams, who has held the University fellowship in botany in Columbia University during the present scholastic year, has been appointed assistant curator in the Division of Plants of the United States National Museum, and will take up the duties of his new position on October 1.

Dr. F. E. Clements, assistant professor of botany in the University of Nebraska, has recently been promoted to be associate professor of plant physiology in that institution. Dr. F. D. Heald, adjunct professor of plant physiology, has been elected botanist of the Nebraska Agricultural Experiment Station and associate professor of botany in the University School of Agriculture.

The second edition of Britton's "Manual of the Flora of the Northern States and Canada" was published about the first of May. The stereotyped plates of the first edition have been revised where practicable and descriptions of over one hundred species have been added to the appendix. Artificial keys to the families of the angiosperms and to the genera of composites, prepared by Dr. Karl M. Wiegand of Cornell University, have also been added.

It is stated in *Science* that Professor D. H. Campbell of Stanford University will devote next year to an extensive trip through Europe, Africa, and Asia. He expects to attend the International Botanical Congress at Vienna and the meeting of the British Association at Cape Town. In the same issue of *Science*, it is announced that Professor Willis L. Jepson of the University of California will spend next year in Europe and in the tropics, gathering material for the botanical museum at Berkeley.

The second annual field symposium of botanists will be held during the week beginning July 3, 1905, at Ohio Pyle, a point on the Baltimore & Ohio Railroad in Fayette County, southwestern Pennsylvania, where arrangements have been made for the accommodation of the party. Information concerning details of the trip and the proposed program may be obtained from

either Mr. Joseph Crawford, 2824 Frankford Avenue, Philadelphia, representing the Philadelphia Botanical Club, from Dr. J. A. Shafer, New York Botanical Garden, Bronx Park, N. Y. City, representing the Torrey Botanical Club, or from Dr. J. N. Rose, U. S. National Museum, Washington, D. C., representing the Washington Botanical Club. The pleasant and profitable experiences gained by those who attended the first of these meetings, held at McCall's Ferry, Pennsylvania, in July of last year, give reason to believe that there will be a large attendance at Ohio Pyle. A detailed report of the proceedings at McCall's Ferry will be found in the February issue of the *Plant World*.

Vol. 5 No. 6

TORREYA

June, 1905

SOME PTELEA SEGREGATES

By Edward L. Greene

Ptelea Carolina sp. nov.

Shrub probably large, apparently glabrous or very nearly so in all its parts; red-brown twigs of the season slightly rugose: leaves large, on stout petioles 3 to 5 inches long; odd leaflet commonly 5 inches long and nearly 3 in breadth, of somewhat rhombic-ovate outline, cuneate at base, cuspidately pointed at apex but the cusp not acute, usually blunt and commonly even emarginate, the whole margin faintly crenate, upper face deep green, lower glaucous, lateral leaflets nearly one-third smaller, not strongly inequilateral: samaras small for the plant, hardly more than one-half inch in diameter, nearly orbicular, retuse at both ends, the body nearly central, round-oval, distinctly rugose, moderately punctate between the ridges; reticulation of wing not at all pronounced.

Mountains of North Carolina, along the French Broad River, in Madison Co., 2 August, 1880, *John Donnell Smith*; the copious type specimens all in his private herbarium. Readily distinguished from the common Virginian and northern *P. trifoliata* by the absence of all pubescence, and the small samaras, these being of only about one-third the dimensions and much less reticulate as to the narrow wing.

Ptelea obcordata sp. nov.

Shrub 10 feet high or more; twigs with red-brown bark finely rugulose and glabrous, as are all the parts of the shrub: leaves of a vivid green on both faces, scarcely paler beneath; odd leaflet 2 to 3.5 inches long, somewhat elliptic-lanceolate, merely acute, not taper-pointed, the margin faintly crenate, the lateral pair about one-third smaller, very inequilateral: samaras very large, some quite an inch long, round-obcordate, abruptly acute at base, the summit with a short sinus between the rounded

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lobes, the body of the samara plainly transverse-rugose and strongly and densely glandular-punctate between the ridges.

Vicinity of Eustis, Florida, June, 1894, *George V. Nash*, according to specimen in U. S. Herbarium. Unlike *P. trifoliata* by its narrow foliage glabrous even when young, and of the same hue on both faces. The samaras also have their marks as unlike those of the northern shrub.

Ptelea mesochora sp. nov.

Foliage of less than half the size of that of *P. trifoliata*, commonly about one-third as large, glabrous or nearly so, very pale and glaucous beneath; odd leaflet 2 or 3 inches long, rhombic-ovate, merely acute, not acuminate or even cuspidate, the laterals rather more than half as large, more or less inequilateral: samaras of the largest, commonly 1 inch long, round-obovate or even slightly obcordate, truncate or subcordate at base, the very broad wing apt to be full and wavy, strongly reticulate, the body oval, small in proportion, excentric, nearer the summit than the base, distinctly rugose, the intervals rather closely punctate.

Of the region of the upper Mississippi valley and vicinity of Lake Michigan; the best specimens by *Umbach*, from Miller's, Indiana, 30 July, 1897; Canton, Ill., 1875, *J. Wolfe*; Oquawka, Ill., *Patterson*, 1874. Distinct from *P. trifoliata* by its much smaller foliage and even larger fruits.

CYTOLOGICAL DIFFERENCES BETWEEN THE PALMELLA AND FILAMENTOUS FORMS OF STIGEOCLONEUM

By Naohidé Yatsu

It has long been known that *Stigeocloneum* takes two different forms according to environmental conditions. In dry atmosphere the alga is spherical and is known as the palmella form, while in a wet place it becomes filamentous. Four years ago, Dr. B. E. Livingston * succeeded in changing one form into the other simply by transferring the alga from one culture solution to another of different strength. At the suggestion of Dr. Mac-

* Livingston, B. E. On the stimulus which causes the change of form in polymorphic green algae. Bot. Gaz. 30: 289–361. 1900.

Dougal I undertook the cytological study of the two forms of *Stigeocloneum*. Owing to the minuteness of the cells, I could not satisfactorily carry out the study, yet I think I obtained a few points of interest. I am under great obligation to Dr. MacDougal for his kindly suggestions and criticisms, and also to Dr. Livingston, who not only has put some of his materials and solutions at my disposal, but also has given me much invaluable information.

I. Methods

Both the palmella and filamentous forms were examined in the living state. Especially was the transformation from one form to the other carefully studied. After several fixing fluids had been tried, I found that Boveri's picro-acetic acid proved better than any other. This, therefore, was used almost exclusively. All the preparations were stained *in toto* with borax-carmine ; the sections were stained either with Auerbach's fluid (mixture of methyl green and fuchsin S) or with iron-alum-haematoxylin. To make total preparations of the filament, the following method was used. A clean cover-glass was touched on the surface of the water in a culture dish, where the filaments were floating. Then the cover-glass was dipped in the fixing fluid, which killed and fastened the algae at the same time. To obtain the total preparations of very young filaments, a drop of weaker solution was put on a cover-glass and a few palmella cells were kept in this drop for a week or so until the young filaments reached the two- or three-celled stage. Then all the solution was drawn off by means of filter paper, and the cover-glass was put in fixing fluid, which, as already stated, fixed and fastened the algae. To cut filaments into sections the following devices were used. A piece of *Ulva*, which had been preserved in alcohol, was washed with water and was fastened with albumen on a cover-glass. Then the *Ulva* was touched to the surface where filaments were floating and the cover-glass with the *Ulva* was put in the fixing fluid. After being clarified, the *Ulva* pieces with algae were peeled off from the cover-glass and cut into sections. The palmella cells were wrapped up in frog's epidermis to be cut.

II. Observations

A. *Filamentous Form.* — In the filamentous form, individual cells are cylindrical, two or three times as long as wide. The cell wall is very thin; the protoplasm spreads along the cell wall as a thin layer, the central part being occupied by a large vacuole. On one side there is a thickening of protoplasm, which sometimes reaches the other side, so that the central vacuole is cut into two. The terminal cell is somewhat different from others; it is usually longer than the rest of the cells and tapers toward the tip. The terminal cell has protoplasm of uniform thickness along all the walls. The central vacuole in it reaches the tip of the cell as a fine canal.

Fig. 1. Filament of *Stigeoclonium*, showing transformation from the palmella form (two lower cells) to the filamentous form (three upper cells), × 1,750. The dark bodies represent the nuclei; the lighter, the pyrenoids.

Chlorophyll granules of small size are found throughout the protoplasm.

The nucleus as a rule lies in the thickening of protoplasm just mentioned. It is difficult to see the nucleus in life. When stained it appears as a homogeneous black body. It consists mostly of chromatin. The presence of the nuclear membrane is in no way demonstrable.

Besides the nucleus there is a refringent pyrenoid body embedded in protoplasm. The position of this is not fixed; sometimes it is found near the nucleus, while in other cases it lies on the side opposite to the nucleus. Quite often it is surrounded by a clear space. In borax-carmine preparations on the other hand, it remains colorless or very light red, the nucleus being stained dark red. In cell-division it divides into two in a way not unlike the nucleus.

The first filament from the spore contains much protoplasm resembling that of the palmella form. The vacuole develops later. At the two-celled stage the terminal cell can be distinguished from the other cells. The branches can be sent off from any cell, the tranverse division taking place only at the tip.

B. *Palmella Form.* — The palmella cells are spherical, or quite often two, three or four cells make a sphere. The walls are thick compared with those of the filament. No vacuoles are found in the protoplasm. The chlorophyll granules are much larger than those found in the filament. In size and other characters of the nucleus one cannot find any difference between the two forms. Palmella cells have much larger pyrenoids than the filaments.

The palmella cells can be directly transformed into the filament by thinning of the walls, acquiring of the vacuoles, etc. In several cases, therefore, the intermediate forms are found.

The palmella form, being put into the weaker solution, usually produces zoöspores, two or four in a cell or sometimes as many as eight. The zoöspore has two flagella and a red eye-spot. The spores after swimming for a while acquire a firm wall or shell. Young filaments, even as late as the three-celled stage, often carry the empty shell at one end.

III. Conclusion

Recapitulating the differences : the filamentous form of *Stigeoclonium* has thinner wall, central vacuole, smaller chlorophyll granules, and smaller pyrenoids, whereas the opposite prevails in the palmella cells. These cytological characters change, as Livingston states, if one form is transferred from one solution into another of different strength. How the solution acts upon the cells I do not know. It is however certain that these complicated structural changes cannot be accounted for simply as physico-chemical action of the solution just as would be the case on an inorganic body. Livingston cites a case in which a dead cell changed its form, when transferred into a solution of different strength. The form change which constitutes a part of the above complicated modification may be due to the osmotic action, but we cannot at all explain from physical point of view how the thickening of the cell-wall, enlargement of the pyrenoid, etc., are brought about.

It is not an easy matter to find out whether or not the adaptation in this case is purposive. It seems to me however, that the increase of the thickness of cell wall and the enlargement of the

pyrenoid (reservoir of nutritive substance) may be indispensable to withstand desiccation or a drier atmosphere.

New York Botanical Garden.

FLOWERING OF YUCCA AUSTRALIS

By S. B. Parish

In 1878, the late Dr. C. C. Parry collected, in northern Mexico, seeds of a remarkable tree Yucca, which he had not been able to identify with any described species. On his next visit to California, in 1880, he gave some of these seeds to the writer. They germinated readily and the young plants were distributed to several friends in San Bernardino valley. They have grown well and have now attained a height of fifteen to twenty five feet, according to cultural conditions. Five years ago, the first of them flowered, producing, on a short, abruptly reflexed peduncle, a massive, compact panicle of pure white flowers, very much resembling in texture and shape the flowers of *Yucca mohavensis*, one of the common indigenous species of this region. It was readily recognized as that species of many synonyms, to which Trelease has given the name *Yucca australis* (Engelm.), perhaps the most distinct of the whole genus.

After flowering, this tree, which, like the others, was unbranched, divided into four short branches, and in the spring of the present year three of these produced each its panicle of flowers. It is shown by the illustration, which is reproduced from a photograph.

The tree is strikingly beautiful when in flower, far handsomer than it appears in the plate in Trelease's Yucceae, which is from a photograph taken in its native habitat in Mexico. Our trees have produced no fruit, doubtless by reason of the absence of the proper *Pronuba*. *Yucca australis* was introduced into the gardens of southern France about 1860, from seed collected by Roezl, the first tree flowering in its sixteenth year, and is there known under a variety of names. In the United States, the San Bernardino trees are probably the only flowering specimens, but it is well worth cultivation wherever the climate is suitable.

San Bernardino, California.

Yucca australis in flower at San Bernardino, California.

BOTRYCHIUM SILAIFOLIUM PRESL

By Lucien M. Underwood

This species was originally described from Nootka Sound, and all the American writers on ferns, commencing with D. C. Eaton, have confused a Californian species with it. I was led into the same error some years ago and wish now to make a correction. The collection of a large amount of material in the State of Washington by Mr. J. B. Flett and by Professor C. V. Piper has shown that the species of that region is nearer to Presl's type than any of the Californian material as yet collected and there seem to be no intermediate forms between the species of northern California and the one of the states farther north. On the other hand, Mr. Flett's specimens show gradations from my *B. occidentale* to the typical equivalents of *B. silaifolium* Presl. After I reached this conclusion two years ago, I learned that Mr. Piper had independently come to the same conclusion, viz., that, *B. silaifolium* Presl and *B. occidentale* Underw. were really one species. *B. occidentale* was described from tall rather slender plants of the species quite in contrast with the more compact form as originally described by Presl and represents an extreme development of the species. The relation of D. C. Eaton's "*sub-var. intermedium*" to this species was pointed out to me long ago by Mr. Gilbert and I am inclined to regard that form as representing the eastern extension of the western species or *vice versa*. I am not yet ready to locate this latter form as a variety or species, and hope that further collection and study will clear up some doubts in the matter.

The synonymy of the western species then is as follows :

Botrychium silaifolium Presl, Rel. Haenk. **1** : 76. 1825. (Type from "Nootka-Sund.")

Botrychium occidentale Underw. Bull. Torrey Club **25** : 538. 1898. (Type from New Westminster, British Columbia.)

Range : Washington to British Columbia.

This transfer of the Washington and British Columbia plants to *B. silaifolium* leaves the Californian plants hitherto referred to that species without a name. They may be described as follows :

Botrychium californicum sp. nov.

The largest of our species, with leaves 20–35 cm. across, the leaf of the preceding year usually long persistent. Roots fleshy, stout, fibrous: common stalk very short, 3–4 cm. long, subterranean; leaf-stalk 10–16 cm. long, stout, fleshy; leaf-blade 20–35 cm. wide, 15–25 cm. long, the three main divisions copiously tripinnate or often quadripinnatifid, the lower divisions more compound on the lower side of the base; segments 9–13 or more to each pinnule, obliquely oval, the larger more or less lobed, the margins crenate or eroded: sporophyl 15–25 cm. long, quadripinnate or more, on a stalk 30–45 cm. high.

This species was figured by D. C. Eaton, Ferns N. A. **1**: *pl. 20a* (lowermost figure only) and called by him "*var. australe*" of his all-embracing *Botrychium ternatum*, the name *australe* coming from one of the smaller (Australian) species of the group, while this is one of the largest. It appears to be confined to northern California. Specimens have been studied as follows:

Sisson, Siskiyou County, 30 July, 1894, *M. A. Howe;* Sierra County, 1874, *Lemmon;* Quincy, Plumas County, *Mrs. R. M. Austin* (type), *Mrs. C. C. Bruce;* Emigrant Gap, *A. Kellogg;* all in the collections at the New York Botanical Garden, which include the collections of Columbia University and those of the writer, now incorporated in a single series.

Columbia University,
12 May, 1905.

SHORTER NOTES

Amelanchier arguta* Nutt.—This species has been mistaken for *Amelanchier oligocarpa* (Michx.) Roem. It differs in smaller, round-oblong fruit, calyx-lobes ovate, acute, about 2 mm. long, leaves ovate-oblong, cuneate at both ends, finely serrate. *A. oligocarpa* has larger, pear-shaped fruit, calyx-lobes lanceolate, acuminate, 3–5 mm. long, leaves oblong, more coarsely serrate. Specimens examined:

The technical type is a sheet in the herbarium of Columbia University inscribed "*Amelanchier arguta* Nutt. Waychusett, Mass."

* *A. arguta* Nutt. in herb. Torrey; Britton, Man. 1066. 1905 [Ed. 2].

Most of the description was taken from my *no. 1119*, Cedar Swamp, Fairhaven, Vt., altitude 100 meters, May 14, 1898, and June 27, 1899, and *nos. 1960* and *1964*, Blueberry Hill Bog, Rutland, Vt.

No. 52d, O. A. Farwell, Keweenaw County, Mich. (Columbia University herb.) and a specimen collected by J. A. Morton, at Wingham, Ont. (Eggleston herb.) are of the same species.

This species seems confined to the cold swamps of low altitude, while *A. oligocarpa* is arctic-alpine.

W. W. EGGLESTON.

NEW YORK BOTANICAL GARDEN.

NATURE'S ENGRAFTING.— About two years ago while wandering over a cypress flat, I found *Pieris nitida* growing from the trunk of *Taxodium imbricarium*. The branch was in a healthy, vigorous condition and grew more than a foot from the ground, as perfect a specimen of engrafting as could be done by the hand of man.

The tree was on the outer edge of the flat. The undergrowth showed no indication of having been inundated for a year at least. A few yards away there were numerous trees (*Taxodium*) standing in water a foot or more in depth, each surrounded by a luxuriant growth of *Pieris*. In the course of time I found the flat perfectly dry, as is the way with these cypress ponds of the pine-barren districts. I lost no time in further investigating the matter. Imagine my surprise, on brushing aside the dense foliage to find many of the trees encircled by a luxuriant growth of the *Pieris*, like a green collarette, quite high from the ground and having no connection with it. In TORREYA of February, 1903, Mr. Roland M. Harper reported the peculiar habit of *Pieris phillyreaefolia* as seen by him in the Okefinokee Swamp climbing the *Taxodium*, explaining that it crept under the bark from the ground, and after ascending quite a height, branched out, having the appearance of a parasite. He also quoted Dr. Chapman's observations with regard to the same peculiar habit of this "make-believe" vine. There was no evidence of such a condition in this case. The plants had every appearance of having flourished and fruited for years. MRS. AUGUSTUS P. TAYLOR.

THOMASVILLE, GEORGIA.

A new Gentian from Bolivia. — **Gentiana dolichantha** Gilg sp. nov. Perennans. Radice ?: rhizomate certe decumbente reliquiis foliorum evanidorum obtecto, apice folia pauca laxe vel laxiuscule rosulata gerente: foliis lanceolatis vel lineari-lanceolatis, apice acutissimis, basi vix angustatis sed haud connectis, sub anthesi semper manifeste recurvatis, utrinque nitidis, subchartaceis, solemniter 3-nervatis: floribus 6-meris puniceis, in apice caulis erecti parce foliosi in cymam 3-floram dispositis, in axillis foliorum inferiorum semper solitariis, tenuissime longe pedicellatis, sub anthesi verisimiliter nutantibus: sepalis in parte ¾ alt. in calycem campanuliformem leviter 10-angulatum connatis, lobis liberis lanceolato-triangularibus, acutissimis: corollae tubo cylindraceo vel anguste cylindraceo, superne paullo ampliato, lobis tubi vix ⅓ longit. aequantibus orbicularibus, breviter apiculatis.

Caule repente 8–12 cm. longo, parte erecta 17–25 cm. Foliis basalibus rosulatis quam cetera caulina haud majoribus, adultis 4–5 cm. longis, 4–5 mm. latis; internodiis 2.5–4, rarius usque 5 cm. longis. Pedicellis 1.5–4 cm. longis. Calycis tubo ca. 8 mm. longo, 5–6 mm. crasso, lobis 2.2–2.8 mm. longis, 2 mm. latis. Corollae tubo 2.2–2.3 cm. longo, 8–9 mm. crasso, lobis ca. 7 mm. diametro metientibus.

Bolivia: Pelichuco, 11,500 ped. s. m. (*Williams, n. 2489.* Flores maio 1902).

Species nova affinis *G. puniceae* Wedd., sed floribus majoribus longius tubulatis calyceque alte connato campanulato diversa.

Ernst Gilg.

Berlin.

A Trio of Grasses new to the West Indies. — Among the plants collected by Mr. W. E. Broadway, in Granada in 1904, is a specimen of *Polytrias praemorsa* Hack., secured at St. George's, growing in pasture land. This grass is native in Java, and its appearance as an introduction into the West Indies is rather interesting.

A word in reference to the nomenclature of this species may be appropriate here. In Hackel's treatment of the Andropogoneae (D. C. Monog. Phan. **6**: 189), in the synonymy under his *P. praemorsa*, in reference to the *Andropogon diversiflorus* Steud. (Syn. Gram. 370), the following statement is made: "nomen specificum a me rejectum quia in speciminibus bene evolutis

spiculae omnes ☿, in macris tantum et raro pedicellatae hebetatae inveniuntur." Of course this is not a valid reason for discarding a name properly published, and cannot be countenanced. Immediately following his publication of *Andropogon diversiflorus*, and on the same page, Steudel describes another species, *Andropogon firmandus*, which Hackel also cites in the synonymy. For some reason unexplained, this specific name is not taken up, although tenable, and the name *praemorsa* adopted, first published by Steudel in the same work (*l. c.*, 409) under the genus *Pollinia*. Steudel cites no specimen as the type of this species but simply indicates that the plant came from Java. The description he gives certainly does not apply to the monotypic genus *Polytrias*, as described by Hackel, for a generic requirement of that genus is that the spikes shall be borne singly, and yet Steudel in the description referred to above distinctly states that in *Pollinia praemorsa* the spikes are in twos or threes. I am aware that Hackel follows his reference to this name with an !, but certainly if this is so the generic character of a single spike breaks down. Of course this question as to the name *praemorsa* really is of little importance, for the name to be used is *diversiflorus*, and the combination should stand as follows:

Polytrias diversiflora (Steud.)

Andropogon diversiflorus Steud., *l. c.*

A second member of the Andropogoneae, also, has made its advent into the West Indies. This is *Ischaemum rugosum* Salisb., a native of Asia. A specimen of this was obtained by Mr. A. H. Curtiss, at Madruga, Cuba, on November 24, 1904, *no. 533*. One other species of this genus, *I. latifolium*, is quite extensively found in the West Indies and on the mainland of South America.

The third introduction is from the New World, and is *Opizia stolonifera* Presl, a member of the Chlorideae, with monoecious spikelets, a native of Mexico. It was first secured by Dr. J. A. Shafer on dry soil, at Regla, Province of Habana, Cuba, April, 1903, *no. 482*; and it has now been again secured at Habana, on December 19, 1904, by Mr. A. H. Curtiss, *no. 571*.

NEW YORK BOTANICAL GARDEN. GEORGE V. NASH.

REVIEWS

North American Flora *

About ten years ago it was proposed to publish under the title "Systematic Botany of North America" a descriptive account of all plants growing without cultivation in North America, north of Mexico. As originally planned, the work was to consist of seventeen volumes, eight of which were to be devoted to the Angiosperms. The different families of plants were assigned to specialists for elaboration, and the following botanists constituted the board of editors: Professors Atkinson, Britton, Coulter, Greene, Halsted and Underwood, and Messrs. Coville and Hollick. For some reason no part of this work ever reached publication, with the exception of a short pamphlet on the Hepaticae by Professor Underwood, in which the species of the single genus *Riccia* were described.

Recently, however, it has become possible for the New York Botanical Garden to assume responsibility for this important undertaking and to carry it on in a somewhat more extended sense than was originally intended. The title has been changed to "North American Flora," and the region treated will include not only the whole of the North American continent, north of Colombia, but also the majority of the West Indian islands. The new publication will be edited by Professors Underwood and Britton and will consist of thirty volumes. Thirteen of these will be devoted to the Thallophytes, two to the Bryophytes, one to the Pteridophytes and Gymnosperms, and the remainder to the Angiosperms. The parts will be issued as rapidly as possible, and different volumes will be in course of publication at the same time.

The part that has just appeared may serve to indicate the plan of the whole work and treatment which the various groups are to receive, although it is possible that this treatment will have to be more or less modified in the case of some of the lower cryp-

* North American Flora, **22** : 1–80. Rosales, by J. K. Small; Podostemonaceae, by G. V. Nash; Crassulaceae, by N. L. Britton and J. N. Rose; Penthoraceae and Parnassiaceae, by P. A. Rydberg. The New York Botanical Garden, 22 My 1905.

togams. After a general account of the Rosales, with an analytical key to the twenty four families included in this order, the genera and species in four of these families are described. The Podostemonaceae are represented by 5 genera with 10 species, the Crassulaceae by 25 genera with 284 species, 30 of which are new, the Penthoraceae by a single genus with one species, and the Parnassiaceae by a single genus with 13 species, 4 of which are new. Under the Crassulaceae, 4 new genera are proposed, and many other recently proposed genera are recognized. An important feature of the work is found in the analytical keys, each genus (unless represented by a single species) having a key to the species and each family a key to the genera.

As a rule the descriptions, both generic and specific, are concise. Under each genus the description is supplemented by an enumeration of the synonyms and the name of the type species. Under each species, in addition to a full synonymy, the type locality and the geographical distribution are described, and references are given to all published illustrations. In the case of a new species, the type locality is described more fully, the name of the collector and the date of collection being added. In most cases, however, no reference is made to the time of flowering or fruiting. It should also be noted that very few of the descriptions are accompanied by critical remarks, these being rendered unnecessary by the numerous keys.

Perhaps the feature of the work which will be most criticized is its strong tendency toward the segregation of large and comprehensive genera into smaller and more rigidly defined genera. A similar tendency is also to be observed in the limitation of species. Both of these tendencics are especially well seen in the treatment of the Crassulaceae. It should be remembered, however, that the descriptions in this difficult family are nearly all drawn from living specimens, and that the segregations are therefore based upon a very intimate knowledge of the plants.

ALEXANDER W. EVANS.

YALE UNIVERSITY.

PROCEEDINGS OF THE CLUB

Wednesday, April 26, 1905

This meeting was held at the museum of the New York Botanical Garden, with seventeen persons present and President Rusby in the chair.

A letter from the Brooklyn Institute of Arts and Sciences proposing coöperation in the field excursions of the Club was read and referred to the chairman of the field committee with power to act.

The announced paper by Dr. P. A. Rydberg on "The Composition of the Rocky Mountain Flora" was omitted by reason of the absence of the author.

"Notes on the Wire-Grass Country of Georgia" was the title of the paper presented by Mr. R. M. Harper.

The wire-grass country takes its name from the wire-grass, *Aristida stricta*, which is common all over it. In a broad sense, the wire-grass country coincides with the pine-barrens, which constitute about two thirds of the coastal plain of Georgia, but for the present purposes the term is restricted to the Altamaha Grit region, an area of about 11,000 square miles.

The climate of the region, as compared with New York City, is about 18° warmer in winter and 9° warmer in summer. The rainfall averages about 50 inches a year, and most of it falls in the growing season. The geographical conditions are remarkably uniform throughout, and on account of this uniformity the flora is not very rich, only about one half as many species being known there as in the state of New Jersey, though the area is larger.

The region is naturally forested throughout, but the forests are mainly of long-leaf pine, which gives little shade. Consequently, the most striking feature of the vegetation as a whole is the adaptation to sunlight, usually manifested by reduction of leaf-surface.

The plants of the wire-grass country can be classified according to habitat into 15 or 20 groups. The principal habitats are

rock outcrops (constituting perhaps about one one-hundredth of one per cent. of the area), pine-barrens (over half the area), swamps, ponds, sandhills, hammocks and bluffs, some of these with several subdivisions.

Civilization has influenced the flora principally through agriculture, lumbering, turpentining and fires. Only a small proportion of the land may be said to be under cultivation. Lumbering has little effect on the herbaceous flora, for the removal of the pine trees does not appreciably diminish the amount of shade. The turpentine operators have been practically all over that part of the country, and have done great damage to the forests. Fires sweep over most of the region every spring, being set purposely by stock-raisers to burn off the dead grass, but the fires do little damage where lumbering and turpentining operations have not been carried on.

The known flora of the Altamaha Grit region consists of about 725 native species of flowering plants, 75 weeds, 20 pteridophytes and 60 bryophytes and thallophytes. The lower cryptogams have been little studied. The largest families are Compositae, 100 species, Cyperaceae, 83, Gramineae, 68, Leguminosae, 50, Scrophulariaceae, 30.

Some of the commonest species of the region are *Pinus palustris*, *P. Elliottii*, *P. serotina*, *Taxodium imbricarium*, *Aristida stricta*, *Serenoa serrulata*, *Eriocaulon decangulare*, *Quercus Catesbaei*, *Eriogonum tomentosum*, *Magnolia virginiana*, *Sarracenia flava*, *S. minor*, *Kuhnistera pinnata*, *Cliftonia monophylla*, *Nyssa biflora*, *N. Ogeche*, *Oxypolis filiformis* and *Pinckneya pubens*.

The following species are common in the wire-grass country (each being known from at least three counties), but are seemingly confined to Georgia: *Sporobolus* (a species with terete leaves), *Rhynchospora solitaria* Harper, *Eriocaulon lineare* Small, *Polygonella Croomii* Chapm., *Siphonychia pauciflora* Small, *Viola denticulosa* Pollard (with leaves a foot and a half long), *Dicerandra odoratissima* Harper, *Pentstemon dissectus* Ell., *Baldwinia atropurpurea* Harper, *Marshallia ramosa* Beadle & Boynton, and *Mesadenia* sp. (near *lanceolata*).

One of the most interesting features of the pine-barren flora,

not generally known to botanists, is that the whole region was submerged beneath the sea in Pleistocene times, consequently the species now confined to the pine-barrens (from New Jersey to Texas), perhaps several hundred in number, have probably originated since that time.

Mr. Harper's remarks were illustrated by many photographs and specimens. The paper was discussed by Drs. Britton and Rusby.

Mrs. Britton then spoke of certain interesting southern mosses, especially of *Erpodium*, a curious genus having the habit of a *Frullania* or *Lejeunea*. A species of this collected many years ago by Sullivant at Augusta, Georgia, was published by Austin as a hepatic under the name *Lejeunea biseriata*. Mrs. Britton discussed and exhibited also numerous mosses from the extreme southern part of Florida. A few of these appear to be undescribed but most of them are of species that are widely distributed in the West Indian region.

Dr. Rusby showed specimens of spurious ipecac roots which have found their way into the markets. The true ipecac (from *Cephaëlis Ipecacuanha* of the family Rubiaceae) is now hard to obtain and high-priced. Some of the spurious root comes from other species of the same genus, but the most common adulterant is from the genus *Ionidium* (*Calceolaria*) of the family Violaceae. Dr. Rusby exhibited also specimens of *Porteranthus stipulatus*, which is sometimes called the North American ipecac.

Dr. Britton showed living plants of two species of Crassulaceae which had come into flower in the greenhouses of the New York Botanical Garden. One was *Sedum Nevii*, hitherto described from dried material, a species collected originally in southwestern Virginia, but since found to extend to Indiana. The other was a *Pachyphytum* from Mexico. Dr. Britton stated that in North America north of the Isthmus, 284 species of Crassulaceae may be recognized, distributed in 25 genera. Representatives of all these genera have now been studied in the living state.

Before adjourning, it was voted to hold the next meeting at the Botanical Garden in the afternoon instead of at the Museum of Natural History in the evening. MARSHALL A. HOWE,

Secretary pro tem.

NEWS ITEMS

Miss Marion E. Latham, A.M. (Columbia, 1905), has been appointed assistant in botany in Barnard College, Columbia University.

Professor George F. Atkinson, of Cornell University, is spending the summer vacation in Europe, engaged chiefly in his studies of the fleshy fungi.

Dr. P. A. Rydberg, of the New York Botanical Garden staff, left New York on May 29, to spend most of the summer in making botanical collections in Utah.

Miss Alice A. Knox, who for the past two years has been assistant in botany in Barnard College, is now assistant in the laboratories of the New York Botanical Garden.

Professor and Mrs. Francis E. Lloyd left New York on June 3, for Tuscon, Arizona, where Professor Lloyd will continue his researches at the Desert Botanical Laboratory of the Carnegie Institution.

Mr. E. W. D. Holway, of the University of Minnesota, has begun the publication of a quarto work entitled "North American Uredineae." Part I of volume I, consisting of 32 pages and 10 plates, was issued April 15.

It is learned from *Science* that Dr. B. M. Duggar, professor of botany in the University of Missouri, sailed for Europe on May 20 and that he will devote the coming year to work in various botanical laboratories on the Continent.

Dr. and Mrs. N. L. Britton sailed for Europe on May 27 to attend the International Botanical Congress in Vienna. They will visit also the botanical establishments in Paris, Geneva, Berlin and Kew, returning to New York in the latter part of July.

Mr. F. V. Coville and Mr. W. F. Wight, of the United States Department of Agriculture, were among the American delegates to the International Botanical Congress which met in Vienna, June 11 to 18. Their names were omitted in the partial list of American delegates published in TORREYA for April.

The annual field meeting of the Vermont Botanical Club and the Vermont Bird Club will be held July 4 and 5, taking this year the form of a cruise to various points of interest on the islands and northern shores of Lake Champlain. A steamer has been chartered for the occasion.

Bulletin No. 68 of the Bureau of Plant Industry is a monograph of the "North American Species of *Agrostis*" by A. S. Hitchcock. Most of the type specimens involved in the study have been seen by the author either in this country or in Europe. The text is accompanied by 37 plates.

The second annual field "symposium" under the joint auspicies of the Philadelphia Botanical Club, the Washington Botanical Club and the Torrey Botanical Club, which will be held at Ohio Pyle in southwestern Pennsylvania July 3 to 8, promises features of unusual interest. The region is said to have an exceedingly rich flora, including many southern elements which are scarcely found elsewhere in the state. Dr. J. A. Shafer and Dr. W. A. Murrill will act as guides on behalf of the Torrey Club.

Fascicle I of "Orchidaceae: Illustrations and Studies of the Family Orchidaceae issuing from the Ames Botanical Laboratory, North Easton, Massachusetts," by Oakes Ames, was published in April. The 16 plates in this fascicle illustrate 19 species, including five new ones from the Philippines. Papers under the titles, "A descriptive List of the Orchidaceous Plants collected in the Philippine Islands by the Botanists of the United States Government," "An *Oncidium* new to the United States," and "Contributions toward a Monograph of the American Species of *Spiranthes*" complete the fascicle.

From the Olivia and Caroline Phelps Stokes Fund for the Protection of Native Plants, the New York Botanical Garden offers the following prizes, payable December 15, 1905:

1. A prize of $25.00 for the best essay on local needs in the vicinity of New York City, not to exceed one thousand words.
2. A prize of $15.00 for the best essay indicating local needs in the parks of New York, not to exceed one thousand words.

3. A prize of $10.00 for the best essay not to exceed five hundred words, indicating needs of any locality. Essays may be submitted not later than November 1, to the Director-in-chief of the New York Botanical Garden, Bronx Park, New York City.

TORREYA

July, 1905

AN EXAMPLE OF COMPLEX LIFE-RELATIONSHIP

By Albert Schneider

The plant as well as the animal kingdom presents numerous very interesting and complex life-relationships which the biologist recognizes as symbioses, the naturalist as struggle for existence, and the socialist, if he is scientifically inclined, as competition.

A somewhat remarkable instance of symbiosis has recently come under my observation. During the vacation months (May, June, and early July) of 1904, my little daughter and myself were in the habit of taking short morning rambles in the vicinity of our Berkeley home. On Hillegass Avenue near Dwight Way, we noted a row of hawthorns (*Crataegus Oxyacantha*), about twelve feet high. Most of the plants were well infested with plant-lice (*Aphis Crataegi*) at this time of the year (June). These pests were found most abundant on the under surface of the leaves and on the young terminal branches and buds, and wherever the bark was unusually thin, injured or abraided; that is, in places where the cell sap was most readily obtainable. Upon closer examination, it was found that some of the plant-lice were of a black color, due to a fungus attacking them. The remarkable feature was that the parasitized plant-lice seemed, at first, to be quite uniformly distributed among the green healthy individuals. Gradually the fungus disease spread, until perhaps one-third to one-half of all the plant-lice on one particular hawthorn were blackened, but not dead. Many were no doubt killed and fell to the ground. A thin scattering stream of ants (the honey ant, *Myrmicocystis melliger*) was continuously moving up and down the trunk and branches of the hawthorns. The ants visited the *Aphis* and took from them the sweet secretion (honeydew) found in the posterior glands. Occasionally an ant

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was seen carrying a plant-louse, usually a young one, down the trunk. What the fate of these plant-lice was we were unable to determine. Perhaps they were intended to serve the purpose of starting new colonies on other plants but more likely they were taken to the home of the ants to serve as food, for ants feed on plant-lice when the appetite is upon them, just as man keeps cows both for milk and meat. I am, however, inclined to doubt the statements of many naturalists who speak of the carefully conducted hygienic aphis-dairying industries of ants. In countries with suitable climatic conditions, as, for example, California, aphides are very plentiful and widely distributed upon a great variety of plants, and ants cannot well avoid running across them on hawthorns, roses, chenopodiums, thistles, plum-trees and a host of other plants.

The starting of new colonies of *Aphis* seems wholly unnecessary, yet who is there to know all of the factors concerned in the ant commercial competition? Be that as it may, the ant is not the only organism that finds the *Aphis* an available economic victim. We noted several species of beetle of the ladybird variety, quite numerous and quite constantly present in the grass (*Poa*) and on other plants near the infested hawthorns. The brown-winged ladybird (*Hippodamia convergens*) was found to feed very voraciously upon the plant-lice. It was roughly conjectured that one ladybird would destroy (feed upon) its own weight of plant-lice in the course of one night. Some of these handsome little beetles were found basking in the morning sun, evidently digesting a heavy meal. Others were busily engaged with their breakfast. This ladybird promises to be of economic value in the extermination of plant-lice. A report on its possible uses is about to be published by the Dept. of Agriculture of the University of California. Another beetle (dark green elytra with black spots) (*Diabrotica Soror*) was also quite constantly present and seemed to feed upon *Aphis*, although it also feeds upon the black fungus on the hawthorn and the diseased plant-lice above referred to. A lightning bug (*Podabrus pruniasus*) is also an occasional visitor and feeds upon plant-lice. The ants and beetles pay no attention to each other, evidently because they realize the fact that they are incapable of harming each other.

A species of yellow-jacket (*Vespa*) visits the hawthorn for the purpose of securing plant-lice for its larvae. Various species of flies (Diptera) were found to visit the plant-lice to take from them the sweet honeydew and these winged aerial marauders take care to keep out of reach of the ants, which they are readily enabled to do. Another and larger species of ant was occasionally found on the hawthorn. While it was quite evident that it was also in quest of the honeydew of the *Aphis*, it was equally evident that it was mortally afraid of the smaller but decidedly more pugnacious honey-ant, making every effort to keep out of the way.

Another ladybird (*Coxinella californica*) also feeds upon the *Aphis*, but is much less voracious in its appetite than the *Hippodamia*. The ladybirds were however not sufficiently numerous to destroy all of the aphides which multiply so rapidly that there seemed to be no diminution in their number, in spite of these numerous life-destroying enemies. Later in the season (the latter part of July and the early part of August), the *Aphis* began to disappear gradually so that practically none remained by the middle of September. This sporadic and often sudden disappearance of *Aphis* has been noted frequently but is not as yet satisfactorily explained. The natural enemies as ladybirds and the fungus referred to are evidently not the only factors concerned in these disappearances. Various birds, as sparrows and others, are often seen to feed upon the *Aphis*, scooping them up in large numbers by a peculiar side twist of the bill.

A black fungus lives upon the leaves, leaf-stalks and younger branches of the hawthorns, causing them to become unsightly in appearance, although no serious damage is done. It is very evident that the plant-lice are the cause of this fungous investment as the growth starts in the *Aphis* and then spreads over the plant. Besides this fungus, there are other vegetable symbionts, as various algae, bacteria and other fungi, which, however, have no apparent influence upon the life history of the host plant (hawthorn). The various more serious diseases of the hawthorn, due to fungi and insects, are not touched upon in this paper as this would further complicate the biological relationship and

furthermore constitutes a condition essentially different from that discussed in this paper.

This interesting symbiosis or biological relationship may be summarized as follows:

1. The bone of contention seems to be the plant-lice (*Aphis Crataegi*) which are antagonistically associated with the hawthorn (*Crataegus Oxyacantha*), feeding upon the cell sap of leaves, growing tips and injured or thin portions of the young bark.

2. A hyphal fungus infests the plant-lice, destroying many of them and finally spreading over the exterior of leaf and stem of the hawthorn. The fungus is therefore decidedly antagonistic to the *Aphis* and rather indifferently antagonistic to the hawthorn.

3. Two species of ant, antagonistic to each other and mutualistic to the hawthorn, feed upon the honeydew of the *Aphis* and upon the *Aphis* itself and are therefore antagonistic to these organisms.

4. Several species of beetles, indifferently associated with each other but mutualistically associated with the hawthorn, feed upon the *Aphis*, forming therefore a decided antagonism to the *Aphis*.

5. One species of ladybird (*Diabrotica Soror*) feeds upon the fungus and diseased *Aphis*, thus forming a mutualistic (though perhaps not pronounced) association with both *Aphis* and hawthorn.

6. The yellow-jacket feeds upon the *Aphis* thus forming an antagonistic association with these as well as with the ants, but mutualistic with hawthorn.

7. A similar association exists between birds, *Aphis*, ants and hawthorn.

8. Flies are antagonistic to the interest of ants as well as *Aphis* and mutualistic to the hawthorn itself.

From this maze of complicated biological relationship it would appear that the plant-lice must be at a decided disadvantage in the struggle for existence, since it is very evident that they have numerous enemies and apparently no true friends. Furthermore, as compared with these enemies they are physically helpless, being mostly wingless, slow of motion and without means of offense or defense. These deficiencies are however

more than balanced by their rapid propagation. In spite of the numerous aids and friends of the hawthorn, the combined work of the *Aphis* and the black fungus succeed in making the plants quite unsightly during the summer months, though none are actually killed.

In conclusion it may be stated that plant-lice are quite easily controlled by spraying and fumigation, directions for which may be obtained from almost any state experiment station or from the Dept. of Agriculture, Washington, D. C. The behavior of the black fungus would suggest a cure by distributing the diseased *Aphis* among the infested plants; or if large numbers of diseased *Aphis* are available, they might be crushed and mixed with water to be applied as a spray, thus spreading the disease more quickly and uniformly. This method would seem especially feasible during a rainy period as moisture favors the spreading of the disease, whereas dry weather promptly checks it. This is certainly worthy a trial and further study. It will also be interesting to find what the California Agricultural College may recommend in regard to the possibilities with the ladybird beetles.

CALIFORNIA COLLEGE OF PHARMACY, SAN FRANCISCO.

QUELQUES MOTS SUR L'ARTICLE DE MR. UNDERWOOD: "A MUCH-NAMED FERN"

BY H. CHRIST

Dans le no. 5, vol. 5 (Mai 1905) de TORREYA, Mr. Lucien Underwood relève le fait, regrettable sans doute, que j'ai rebaptisé une petite fougère, nommée d'abord *Acrostichum Moorei* E. G. Britton, sans connaître son nom primitif, et que j'ai changé plus tard mon nom à plusieurs reprises. Avec la verve critique qui lui est propre, il se récrie: "And all this is German systematic (?) botany of the twentieth century instead of the nineteenth, where it would not so much surprise us."

Je me hâte de revendiquer ce compliment exquis pour moi exclusivement, pour moi qui ne suis point Germain, mais humble Suisse, absolument neutre dans la lutte acharnée des grandes nations qui s'infiltre partout, même dans la Science aimable!

Car, si Mr. Hieronymus — de race Germanique celui-là — a commis aussi une petite erreur en fait de la nomenclature de cet *Acrostichum*, ce n'est qu'une peccadille, à laquelle il a été entrainé par moi.

Admettons donc que j'ai "overlooked" la publication de Britton, et confessons notre péché. Est-ce un péché véniel ou non? Je n'ose le discuter, mais y a-t-il un seul botaniste systématique, y compris les Américains les plus avancés, dont la conscience est parfaitement limpide a cet égard? *

Mais Mr. Underwood m'accuse d'avoir rebaptisé la plante plusieurs fois encore, et telle accusation lancée sans explication aucune, doit diminuer singulièrement l'appréciation de mes travaux aux yeux de mes confrères Américains. Heureusement, je suis un peu moins noir que le grand critique de Bronx Park se plaît à me dépeindre, car je n'ai pas rebaptisé à tort et à travers, par inadvertance ou incurie, mais par des motifs sérieux, comme Mr. Underwood a dû savoir, et je lui reproche de ne pas avoir éclairé le lecteur sur ces motifs-là, car alors le lecteur aurait dû juger autrement de mon travail.

Mr. Underwood doit savoir qu'il y a des cas où il est non seulement permis, mais où il est de rigueur de changer des noms, droit dont il a usé lui-même sur une énorme échelle, en changeant presque tous les genres généralement admis jusqu'-ici et admis par lui-même auparavant.

Eh bien, montrons au lecteur très-brièvement comme je suis arrivé à changer ce nom :

J'ai placé la plante que je croyais nouvelle et non decrite alors, dans mon livre Farnkr. der Erde 46 dans le genre *Rhipidopteris*, en l'appelant *R. Rusbyi.*

Dans ma monographie du genre Elaphoglossum 99 où j'ai réuni, je crois par de bonnes raisons, le genre *Rhipidopteris* comme une section au grand genre *Elaphoglossum*, j'ai nommé la plante *E. Bangii.* On peut critiquer le changement du nom spécifique

* Du reste, lorsque Mr. Underwood m'a rendu attentif, par lettre privée à mon erreur, je me suis hâté de la rectifier (voyez Bullet. Herb. Boiss. II. 3 : 148. 1903) et j'avoue que les usages entre confrères, au moins ceux qui sont en vigueur en Europe au 20ème siècle, auraient autorisé Mr. Underwood de se contenter de ce *peccavi* public, sans le relever encore une fois dans la TORREYA.

au point de vue des règles de Genève, mais je suis un vieux routinier qui ai commencé ma botanique déjà dans la première moitié du 19e siècle, et je me suis laissé entraîner par un sentiment de justice envers celui qui a découvert la plante : Mr. Bang, dont j'ai voulu rappeler le nom à l'occasion du changement du genre. C'est une infraction au code, j'en conviens, mais on sait qu'il y a de ces têtes carrées, aimant la liberté, qui se permettront toujours de ces écarts-ci. Plaignons-les, mais consolons-nous, car ce sont de vieux troupiers qui heureusement ne vivront plus en peu d'années, et laisseront le champ libre aux nomenclaturistes corrects du plein 20e siècle.

Plus tard, j'ai eu le grand plaisir d'obtenir le premier échantillon sorifère de notre plantule, dont je n'avais vu auparavant que des pieds stériles. C'était pour moi une révélation, sous l'impression de laquelle j'ai écrit mon article qui porte l'inscription un peu emphatique : "*Elaphoglossum* (*Microstaphyla*) *Bangii*, une fougère ancestrale." (Bullet. Herb. Boiss. II. **1** : 588.) J'ai démontré pour la première fois et victorieusement, car Mr. Underwood l'admet après moi, que la plante n'est point un *Polybotrya* comme on a cru auparavant, mais a les plus grands rapports avec le *Microstaphyla* de Ste. Hélène et sert à mettre en lumière cette espèce isolée en la liant intimement aux Elaphoglosses.

Mr. Underwood qui aime à voir des genres là où d'autres ne voient que des sections, s'est donné la satisfaction de rebaptiser notre plante pour la *cinquième* fois, tout en suivant ma manière de voir, en l'appelant *Microstaphyla Moorei* (E. G. Britton) Underw., procédé auquel nous n'avons rien à objecter.

Il résulte de ces "details of the story" que nous avons remanié les noms, non par plaisir ou par négligence, mais successivement à la recherche des affinités naturelles de la plante, affinités que nous avons pu fixer enfin.

A mon humble avis, Mr. Underwood aurait agi plus correctement en disant deux mots de tout cela aux lecteurs de la TORREYA, au lieu de les placer sous l'impression que les Germains changent les noms par pure "carelessness." La science a son développement qui est souvent laborieux et nécessite des amendements, des changements. Il y a peu d'esprits absolument

primesautiers qui trouvent infailliblement le juste au premier essai ; même en Amérique ils sont rares. La science fait donc bien de se contenter aussi d'ouvriers modestes qui arrivent au résultat avec plus de peine, en tâtonnant.

BÂLE, SUISSE,
16 Juin, 1905.

DERIVATION OF THE NAME CHAMAECRISTA

BY EDWARD L. GREENE

Called on not long since in private for an explanation of the meaning of the generic name *Chamaecrista*, I think it may be well to offer here in detail the answer which I then gave in brief, and orally to the enquirer; for the name has never been explained in any book, the genus itself dating, practically, from my own defense of its validity made publicly only a few years ago.*

The derivation of *Chamaecrista* is so inseparably connected with the history and nomenclature of an older and nearly related genus that one must go back to the botany of more than two centuries ago for the real origin of the name in question.

One of the most graceful and elegant, if not the most showy, among many ornamental trees and shrubs of the family of the Caesalpiniaceae is that to which Linnaeus gave the name *Poinciana pulcherrima*, a shrub now common in parks and gardens in all tropic and subtropic lands and often to be seen in conservatories far northward. In its large clusters of few and large flowers, the bright red stamens are more conspicuously beautiful than the yellow corollas. There are ten of these to each flower, the greatly elongated glossy filaments each surmounted by its anther, and all standing out away beyond the corolla ; and this cluster of stamens evidently suggested to the first botanical observer and investigator of the shrub, that crest of slender graceful round-topped feathers that adorns the head of a peacock ; and, as this superbly flowering shrub was then new and in need of a name, the botanist, whom I shall presently mention, called it *Crista Pavonis*.

* Pittonia, 3 : 238.

The author was Jacob Breyne, whose fine folio of descriptions, with excellent copper-plate engravings, of one hundred new or rare exotics, was published at Dantzic, in the year 1678, and now numbers itself among the rich classics of seventeenth-century botany. Up to that time, as well as even somewhat later, botanical nomenclators were indifferent as to whether a generic name were made up of one word or of two, or even three; and Breyne, in the present instance, offered to the public a choice between two names for this new type, each of them a generic name of two terms, each alluding to that semblance of a peacock crown presented by the stamens. It might be denominated "*Frutex Pavoninus*, sive *Crista Pavonis*"; and contemporary botanists adopted the second of the two; and this latinization of peacock's crest remained the accepted name of this beautiful genus until Tournefort — something of a reformer in nomenclature — renamed it *Poinciana*.

Thus far we seem to have arrived at no more than the origin of the last half of the name *Chamaecrista;* but the history of the first half may be told more briefly.

In the selfsame volume in which *Crista Pavonis* was published as a genus, Breyne proposes a second new genus belonging to this same family; the type of this a low herb, yet in some of its aspects so much like *Crista Pavonis* that he names this one *Chamaecrista Pavonis*, the low, or dwarf peacock's crest. This plant so named by Breyne is the historic type of the modern genus *Chamaecrista*. Linnaeus, in 1753, decided that it might be viewed as a species of the genus *Cassia*, and, dropping the second term, *Pavonis*, of Breyne's double-worded generic name, the great reformer assigned the plant the binary name *Cassia Chamaecrista*.

In restoring to its well-merited rank this genus originally proposed by Breyne, it was fitting that it should bear the name *Chamaecrista* rather than Breyne's original and too sesquipedalian *Chamaecristapavonis*. We realize our general indebtedness to the Swedish reformer of nomenclature, who knew so well how to abbreviate names that seemed too long; and we seem likely to need him again, or some other in his place, by and by; for

Chamaecristapavonis, long as it looks, is but by one syllable longer than a somewhat recent generic name *Pseudocymopterus*, and is of just the same length as *Neowashingtonia*, still more recently proposed.

WASHINGTON, D. C.

TWO MISINTERPRETED SPECIES OF XYRIS

BY ROLAND M. HARPER

The name *Xyris flexuosa* Muhl. has been almost always applied to a certain widely distributed species which is about the only representative of its genus over most of the glaciated region of the northeastern United States.* This name is usually considered as dating from the first edition of Muhlenberg's Catalogue, published in 1813, but in that work there is nothing by which the species can be definitely identified, and indeed no specific descriptions were attempted in the whole catalogue. (The words in the fourth column, on which so much stress was laid by Mr. Bicknell and Dr. Robinson in discussing the identity of certain species of *Agrimonia* a few years ago, are expressly stated by Muhlenberg in his preface to be merely the English names of the species, and they cannot therefore be regarded as descriptions.) For the original description of *Xyris flexuosa* we must turn to the first part of the first volume of Elliott's Botany of South Carolina and Georgia, published in 1816, in which four species of *Xyris* were recognized. Two of these were new, based on the collections of Dr. Baldwin in Georgia, and another was identified by Elliott with *X. brevifolia* Mx., but was later found by Dr. Chapman to be quite different, and named by him *Xyris Elliottii*. The remaining one is *X. flexuosa* Muhl., and the description, habitat, and time of flowering assigned to it point clearly enough to a plant with corkscrew-like stem and twisted leaves which we now know to range from New Jersey to Florida and Texas, mostly in the pine-barrens, and which was known to nearly all 19th century authors as *X. torta*. Elliott gives as a synonym *X. caroliniana* Walt., but this species can hardly be identified, since it was the

* See Rhodora 7: 73. 1905.

only *Xyris* mentioned by Walter, and the description gives none of the characters by which the several species are now distinguished from each other. There is said to be no specimen bearing this name in Walter's herbarium, but even if there was it would not validate a totally inadequate description, so the name *X. caroliniana* Walt. should be dropped entirely, unless we accept the interpretations of Lamarck, Vahl and other authors who published between the times of Walter and Elliott. In 1860 Elliott's *Xyris flexuosa* was identified by Dr. Chapman with his own *X. platylepis*, and if this identification was correct *X. platylepis* would become a synonym; but it was evidently not correct, and Dr. Chapman himself questioned it in the last edition of his Flora, in 1897.

As for *Xyris torta*, described by J. E. Smith in the 39th volume of Rees's Cyclopedia in 1819, Dr. A. B. Rendle showed a few years ago * that that was really the common northern plant known for years as *X. flexuosa;* and on this representation *X. torta* was relegated to synonymy in Britton's Manual and Small's Flora. But according to the evidence brought out above, both names seem to be valid, though they will have to be interchanged, as follows:

XYRIS FLEXUOSA Muhl.; Ell. Bot. S. C. & Ga. **1**: 51. 1816.

? *X. caroliniana* Walt. Fl. Car. 69. 1788. (Unrecognizable.)

"*X. torta* J. E. Smith" Kunth, Enum. **4**: 14. 1843; and many subsequent authors.

X. arenicola Small, Fl. S. E. U. S. 234. 1903.

Range: New Jersey to Florida and Texas, in the coastal plain, especially in the pine-barrens.

XYRIS TORTA J. E. Smith (no. 11), Rees's Cycl. 1819.

X. bulbosa Kunth, Enum. **4**: 11. 1843.

"*X. flexuosa* Muhl." Chapm., Fl. S. U. S. 500. 1860; and all or nearly all subsequent authors.

Range: Eastern United States and adjacent Canada, chiefly in the glaciated region.

Other synonyms can be found in the paper by Dr. Rendle mentioned above. Dr. Small, who has given this genus consid-

* Jour. Bot. **37**: 497–499. 1899.

erable study, believes the Cuban *X. conocephala* Sauv. (proposed as a substitute by Dr. Rendle) distinct from the North American pine-barren species.

College Point, New York.

PROCEEDINGS OF THE CLUB.

Tuesday, May 9, 1905.

This meeting was held in the afternoon at the N. Y. Botanical Garden, President Rusby in the chair and 42 members and visitors present.

Miss Caroline R. Dana, of Newark, and Dr. Wilhelm K. Kubin, of New York, were elected to membership.

The meeting was devoted to the exhibition and discussion of the various forms of American violets.

The following persons exhibited living material: A. Cuthbert, Augusta, Ga., *Viola Carolina;* C. D. Beadle, Biltmore, N. C., *V. villosa* and *V. tripartita;* F. M. Rolfs, Lake City, Fla., *V. multicaulis* and *V. Carolina;* President Ezra Brainerd, Middlebury, Vt., *V. septentrionalis*, *V. Brainerdi*, *V. LeConteana*, *V. rotundifolia*, *V. rostrata* and *V. arenaria;* Geo. E. Osterhout, New Windsor, Col., *V. nephrophylla*, *V. retusa* and *V. Nutallii;* Miss F. A. Mulford, Hempstead, N. Y., *V. pedata*, *V. Mulfordae*, *V. Brittoniana* and *V. sagittata;* Professor H. H. Rusby, Forest Hill, N. J., *V. villosa*, *V. sagittata*, *V. palmata*, *V. pubescens*, *V. scabriuscula*, *V. cucullata* and *V. labradorica;* Miss Lillie Angell, Orange, N. J., *V. Angellae;* Miss Delia W. Marble, Bedford, N. Y., *V. pubescens*, *V. papilionacea*, *V. palmata*, *V. cucullata* and *V. blanda;* Dr. J. Schneck, Mount Carmel, Ills., *V. striata*, *V. papilionacea* (three forms), and *V. Rafinesqui;* R. C. Schneider, *V. lanceolata;* Percy Wilson, *V. cucullata*, *V. papilionacea*, *V. lanceolata*, *V. rotundifolia*, *V. scabriuscula*, *V. pubescens*, *V. labradorica*, *V. fimbriatula* and *V. palmata;* Quercus Shafer, *V. palmata*, *V. cucullata*, *V. obliqua* and *V. blanda;* and W. W. Eggleston, *V. obliqua*, *V. palmata*, *V. sororia*, *V. cucullata*, *V. Porteriana*, *V. fimbriatula* and *V. palmata*.

Extensive herbarium material was also exhibited.

The discussion was opened by Dr. N. L. Britton who spoke of the recent specific differentiations by various authors. He was of the opinion that many of these were doubtful and that while we had perhaps twice as many good species as were recognized in Gray's time, we have only about half as many species as have been proposed. The speaker then gave a general sketch of the group, noting that while preëminently north temperate they extend into the southern hemisphere along the highlands in both the Orient and the Occident. There is only a single endemic and one introduced species known from the West Indies. Mexico furnishes perhaps half a dozen species, and there are numerous species in the highlands of South America. Our violets fall naturally into two habit groups, the acaulescent and the stemmed. A rather common character is the occurrence of cleistogamic flowers, which are borne on horizontal or erect scapes according to the species. The speaker passed the various species in review, paying particular attention to those of eastern North America.

Stewardson Brown, of the Philadelphia Botanical Club, was called upon to review Dr. Britton's remarks. He said that in the main he agreed with Dr. Britton's views of specific validity. He called attention to a form from the vicinity of Philadelphia which Stone recently identified as *Viola septemloba* LeConte, of the *palmata* group, and which the speaker believed to be something different. Attention was directed also to *Viola obliqua*, one of the earliest and most abundant violets in the Philadelphia region. The speaker described the *sagittata-fimbriatula* group as one of the most intergraded and least understood of any of the groups of acaulescent blue violets.

Continuing the discussion, W. W. Eggleston mentioned the occurrence of what he believed to be a hybrid form. He also called attention to President Brainerd's methods of studying violets under cultivation and observing their fruit characters.

L. H. Lighthipe discussed *Viola Angellae*, holding it to be distinct from *Viola palmata*, the differences showing in the character of the flowers and of the summer leaves. Miss Angell, who was present, told of her studies of this species and called

attention to the extraordinary size of the summer leaves. Dr. Rusby in the course of his remarks mentioned a very early form which is apparently the variety *cordata* of *Viola cucullata* of Gray. This form has been studied extensively by Miss Sanial, one of the club members.

Dr. Rydberg spoke of the violets of the Rocky Mountain region, passing in review the various species from that section and directing attention to the occurrence of the common European *Viola biflora*, which reappears in Colorado.

Dr. Shull spoke of the difficulty he had experienced in germinating violet seeds, and in the discussion it was brought out that violet seeds are apt to lose their vitality upon drying.

Dr. MacDougal spoke of the difficulties attendant upon mutation experiments with the violets, and advocated experiments to test any possible theories as to hybrids.

After some further discussion by Dr. Britton and others, this most interesting meeting was brought to a close.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Dr. and Mrs. N. L. Britton returned from their European trip on July 15.

We are informed that the death of Mr. Henry Eggert of East St. Louis, Illinois, who was well known as a botanical collector, occurred a year ago last April.

Mr. George V. Nash and Mr. Norman Taylor of the New York Botanical Garden sailed on July 6 to spend several weeks in making botanical collections in Haïti.

It is stated in a recent number of *Science* that Frederick C. Newcombe has been appointed professor of botany, and Charles A. Davis curator of the herbarium at the University of Michigan.

It is stated in the *Stanford Alumnus* that Dr. E. B. Copeland, who has been engaged in botanical work in the Philippines for about two years, has resigned his position there and will return to the United States this summer.

Dr. William C. Coker, professor of botany in the University of North Carolina, Chapel Hill, N. C.; Dr. Raymond H. Pond,

professor of botany in the Northwestern University School of Pharmacy, Chicago, Ill.; and Howard J. Banker, professor of biology in De Pauw University, Greencastle, Indiana, are devoting parts of the summer vacation to special studies at the New York Botanical Garden.

Mr. Arthur Woodbury Edson, assistant physiologist, Bureau of Plant Industry, United States Department of Agriculture, died suddenly at Waco, Texas, on June 23. Mr. Edson was a graduate of the University of Vermont and was appointed a scientific aid in the Bureau of Plant Industry in 1901. He was engaged in experiments in plant-breeding upon cotton in Texas and had already obtained valuable results in the way of producing early ripening varieties which escape the worst ravages of the boll-weevil and possess other desirable qualities.

Botanical visitors in New York since January 20, not already mentioned in Torreya, include Dr. C. F. Millspaugh, Field Columbian Museum, Chicago; President Ezra Brainerd, Middlebury College, Middlebury, Vt.; F. V. Coville, C. V. Piper, and William R. Maxon, Washington, D. C.; Dr. R. G. Leavitt, Ames Botanical Laboratory, North Easton, Mass.; Professor E. C. Jeffrey, Harvard University, Cambridge, Mass.; George E. Osterhout, New Windsor, Colorado; C. G. Pringle, University of Vermont, Burlington, Vt.; W. H. Blanchard, Westminster, Vt.; Dr. G. Hochreutiner, University of Geneva, Switzerland; Dr. Anstruther Davidson, Los Angeles, California; Dr. Clifton D. Howe, Biltmore Forest School, Biltmore, North Carolina; Dr. Otis W. Caldwell, Illinois State Normal School, Charleston, Illinois; Dr. George H. Shull, Station for Experimental Evolution, Cold Spring Harbor, N. Y.; Dr. Forrest Shreve, Johns Hopkins University, Baltimore, Md.; Professor William L. Bray, University of Texas, Austin, Texas; and Professor W. L. Jepson, University of California, Berkeley, California.

At the International Botanical Congress held in Vienna, June 12–17, the American botanists in attendance were Arthur, Atkinson, Barnes, Barnhart, Britton, N. L., Britton, E. G., Brown, E., Campbell, Coville, Duggar, Knoche, Perkins, J., Rehder, Robinson, B. L., Shear, Trelease, Underwood. The deliberations upon

questions of taxonomic nomenclature, which constituted one of the principal ends of the Congress, were carried on under the chairmanship of M. Charles Flahault, director of the botanical institute of Montpellier, France. The consideration of the nomenclature of cryptogams (outside of the Pteridophyta) was referred to a commission to report to the next international congress five years hence. The Congress then proceeded to vote upon various nomenclatorial propositions, following the "Texte Synoptique" arranged and published in advance by Dr. J. Briquet of Geneva, reporter general of the international nomenclature commission. The following *résumé* of the action of the Congress regarding some of the more important principles under discussion has been extracted from a private letter and is subject to official modifications. 1753–1754, as the double initial date for the nomenclature of vascular plants, was approved by a vote of 150 to 19. The proposition to formulate a list of a generic names to be preserved regardless of all rules was favored by a vote of 133 to 36 and the preparation of such a list was referred to a committee. The "Kew Rule" principle, involving the maintenance of the first specific name combined with the accepted generic name, was rejected, but with certain exceptions which were regarded as being so much in the nature of a compromise that only two votes were recorded in opposition to the articles that finally prevailed. Duplicate binomials (*e. g.*, *Taraxacum Taraxacum*) were rejected by a vote of 116 to 72. The idea of fixing the application of generic and specific names by the "method of types" advocated in the "American Code" was not accepted, an alternative proposition being approved by a vote of 106 to 74, many of those who voted with the minority favoring some method of "types" for the future without retroactive provisions. By a vote of 105 to 88, it was voted, in substance, that after January 1, 1908, the publication of a new name must be accompanied by a diagnosis in Latin. The actions of the Congress may be said to be, on the whole, rather encouraging to the optimistically inclined who believe that a few more such international congresses at intervals of five years may result in the establishment of a series of rules of nomenclature which shall be tolerably final and stable.

Vol. 5 No. 8

TORREYA

August, 1905

OBSERVATIONS ON THE FLORA OF THE ISLE OF PALMS, CHARLESTON, S. C.

By W. C. Coker

There has been little done in recent years toward the classification of the coast flora of South Carolina into its component parts, or toward determining the northern limit of a number of subtropical species that reach our shores. Several of our southern states have been or are now being investigated in a rather thorough manner, and it is to be hoped that the useful work of the neighboring states will be extended into South Carolina. Lloyd and Tracy have published on the insular flora of Mississippi and Louisiana; in Alabama, Mohr has completed a valuable botanical survey of the state; and in Georgia, Harper is now working along similar lines. Kearney has published two important papers on the littoral flora of North Carolina, and Johnson has published notes on the flora of Beaufort, N. C. To the northward this work has been extended into New Jersey and Delaware by Harshberger and by Snow. There is little to be found on the littoral flora of Florida except a few notes by Dr. H. J. Webber in *Science*, 1898.

In the hope of adding a little to our knowledge of the distribution of the South Carolina coast flora I took the opportunity while on the way to Florida in 1903 to stop a few days in Charleston and make a survey of the western end of the Isle of Palms. Not until recent years has this island been easily accessible and I know of no botanists who have visited it except representatives of the U. S. Department of Agriculture who collected grasses there a few years ago. The Isle of Palms is in shape somewhat like a ham, with the large end eastward and the west end tapering to a rounded point, which is separated from Sullivan's Island by a narrow channel. The island faces the open ocean

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to the south and is separated from the mainland by wide marshes dotted with a few small islands. The Isle of Palms is about four and one-half miles long and one mile across at the broadest part. The time at my disposal being limited, I did not attempt to study the entire island, but confined myself to the western half. Within this small area, however, there is as great a diversity of ecological conditions as is generally found over a much more extended region. From the few struggling and half-buried halophytes of the beach one may pass over the outer dunes with their grasses and the inner dunes with their palms, then across a narrow marshy strip and into a dense forest of oaks and pines, with trees over forty feet in height — and all within a distance of three hundred yards.

It will probably be best to begin by describing the vegetation as it appears in passing from the shore on the south side to the marshes on the north.

The Upper Beach. — Just above ordinary high tide there is an area of varying width where the sand remains constantly damp and is occasionally flooded by very high water. At places along this narrow strip of damp sand there was coming up an immense quantity of seedling sea-oats (*Uniola paniculata*), which was preparing to hold the sand together for a new line of dunes. Although I have observed shores fringed with sea-oats at various places in North Carolina, South Carolina and the Bahama Islands, this is the first time that I have ever noticed the *Uniola* seeding itself in any quantity. Besides the *Uniola* there was very little else to be found in this strip except an occasional specimen of *Salsola Kali*, *Croton punctatus*, *Atriplex arenaria* and *Amaranthus pumilus*. This is as far south as this interesting species of *Amaranthus* is known to occur.

The Dunes. — Beginning with the low ridges just back of the upper beach, the dunes rise gradually by broken and irregular ridges and knolls until they terminate abruptly in an elevated ridge, sometimes twenty or more feet above sea-level, which is slowly advancing in places to cover and destroy the dense growth in the marshy strip behind it. The tops of the low outer dunes are held by several sand-binding grasses, each of which seems to

dominate particular elevations. *Uniola*, which is most abundant, covers many of the ridges, *Sporobolus virginicus* has possession of others, and *Panicum amarum* and *Spartina polystachya* occur in considerable quantity. Kearney has called attention to a fact just mentioned — that each species seems to have complete control over certain areas and a mixture of several is rarely seen. Excluding the grasses, the vegetation is very scanty. *Croton maritimus*, *Iva imbricata* and *Salsola Kali* are the only species that seem capable of existing here. The *Iva* and the *Salsola* are extremely succulent, the *Croton* less so, but well protected by shining scales. In the depressions behind the outermost dunes, where moisture prevents the sand from being easily disturbed, several other plants appear in addition to the ones just mentioned. *Euphorbia polygonifolia* and *Oenothera humifusa* are not rare in such positions, and the troublesome grass *Cenchrus tribuloides* is abundant. *Leptochloa fascicularis*, a grass that is rather common here, assumes among these outer dunes a very different form from the specimens in more stable soil. Its branches are here long and straggling and of a reddish color, while on the landward side of the island it is much more delicate and turf-like. At certain places the tide makes in between the outer ridges and floods the depressions behind them. On the borders of one of these flooded depressions I was delighted to find a beautiful growth of the trailing tropical sand-strand plant *Ipomoea littoralis* (L.) Boiss., which takes the place here which is generally occupied farther south by the much more common *Ipomoea Pes-Caprae*. In Fig. 1 is given a photograph of this spot with *Ipomoea littoralis* in the foreground. It will be noticed that the tips of some of the long runners are submerged at high tide. As far as I can determine, this is as far north as this plant has been recorded on our shores. The other plants represented in the photograph are *Spartina polystachya*, covering a little knoll in the middle to the left. *Uniola paniculata* in center and left of background, *Panicum amarum* in background to right, and a few clumps of *Salsola Kali* in center to right.

In the somewhat sheltered depressions among the dunes there are also present a few scattered specimens of *Yucca gloriosa*.

About two-thirds of the way back to the inner ridge the tropical palmetto (*Inodes Palmetto*) suddenly appears in abundance and extends backward over the inner dunes (avoiding only the unstable crest where they terminate) into the fresh marsh and the woods behind. The long irregular line of luxuriant palmettoes capping the dunes presents a most attractive picture and gives to this island a clear title to its name. Among the palmettoes

FIG. 1. Strand- and sand-dune vegetation, Isle of Palms, S. C. See page 137.

occur large clusters of the familiar poke-berry (*Phytolacca decandra*). The capacity of this weed to flourish in such unfavorable situations was a surprise to me, and I have not seen it mentioned as a strand plant by others. Scattered here and there on the almost bare sand are clumps of *Salsola Kali* with its succulent spiny leaves and an occasional specimen of *Yucca aloifolia*. Here also was found a little *Physalis pubescens* and the very interesting *Polygonum maritimum*, which in habit and appearance scarcely recalls the other species of the genus. Of the four sand-binding grasses mentioned as prominent on the outer ridges, only *Uniola* extends backward among the palms, but *Cenchrus tribuloides* is everywhere present in dry soil except on the most unstable sand. In certain places the inner ridge was lower and more broken and

in such spots the live oak, *Quercus virginiana*, forms low and contorted thickets, over which twines the yellow jessamine (*Gelsemium sempervirens*).

A photograph of the dunes taken from their inmost edge is given in Fig. 2. In the center of the photograph, between the palmettoes is a large clump of *Phytolacca decandra;* sea-oats (*Uniola*) occupy the ridges in background; in foreground is *Cenchrus tribuloides.* In foreground to left is shown half of a plant of *Salsola Kali.*

As mentioned above, the dunes terminate at this part of the island in a high unstable ridge which is in places being constantly

FIG. 2. Sand-dunes from inmost edge, Isle of Palms, S. C. See text above.

extended landward by the pouring of sand down its inner slope. The inward advance of the dunes, however, has not been sufficient, so far, to cover to any extent the forest behind and produce the "graveyards" of trees that are so conspicuous at some places along our coast.

Even where the sand is in motion, a number of vines nearly always succeed in gaining a position on the incline, and though constantly covered by the moving sands their tips as constantly emerge and continue their growth. The vines that most successfully contended with this shifting sand were *Ampelopsis ar-*

borea (*Cissus bipinnata*), the Virginia creeper (*Parthenocissus quinquefolia*), the poison ivy (*Rhus radicans*) and the wild muscadine (*Vitis rotundifolia*). These would frequently succeed in stopping the sand march, and would then cover its dune slope with a dense mat of green. Other vines also took a part in this struggle: may-pop (*Passiflora incarnata*) with its fine purple flowers and yellow fruits, and *Smilax Bona-nox* were common. In situations where the dune slope had become fixed by vegetation, a number of trees, shrubs and herbs were well established. The live oak (*Quercus virginiana*), red bay (*Persea Borbonia*), and red mulberry (*Morus rubra*) often attained the proportions of trees, and almost reached the top of the dunes. The following shrubs often formed dense clumps in such places: French mulberry (*Callicarpa americana*) with handsome purplish fruits, *Myrica carolinensis* and *Ilex vomitoria*. In Fig. 3 is shown the

FIG. 3. Ridge of sand-dunes with swamp and forest behind, Isle of Palms, S. C. See text below.

ridge of the dunes with the marshy strip and forest behind. To the left a palmetto is being covered by the sand. The vines climbing up the slope around the palmetto are *Ampelopsis arborea*, *Parthenocissus quinquefolia* and *Passiflora incarnata*. The large live oak to the left with its top sheared by the wind is being

slowly killed. The two dead oaks in center were probably killed by an increase in the amount of moisture in the soil. In foreground to right is shown the low vegetation of the marshy strip.

In addition to the trees mentioned above as occurring on the inward faces of the dunes, others may be found in the best protected situations. These are *Quercus laurifolia* (laurel oak), *Salix fluviatilis* and *Juniperus virginiana*. The only fern discoverable here was the ubiquitous *Pteridium aquilinum*.

As the narrow western end of the island is approached the dunes become sharper and higher, the palms disappear, and the forest gradually runs out into a lower hammock growth, disappearing about one mile from the point. The inner faces of these higher dunes are covered with *Uniola*, among which *Strophostyles helvola*, the beach bean, is so abundant as almost to hide the sand. Among these two dominating species there is a good deal of *Croton punctatus* and *Passiflora incarnata*. Behind the dunes at this point there is a long depression, in places slightly marshy, which is covered with a dense mixed coppice of shrubs about ten feet high. The most abundant species here is *Myrica carolinensis*, but with it are red bay (*Persea Borbonia*), cedar (*Juniperus virginiana*), red mulberry (*Morus rubra*) and live oak (*Quercus virginiana*). In places *Smilax Beyrichii* and *Ampelopsis arborea* (*Cissus bipinnata*) form a dense canopy over the shrubs. On the bare ground beneath a good quantity of *Agaricus campestris* was growing. On the edges of the coppice grew *Callicarpa americana*, *Baccharis halimifolia*, *Solanum nigrum*, *Monarda punctata*, *Rubus trivialis* and *Ascyrum stans*.

The Fresh Marsh.— Returning to that part of the island further to the east, represented in Fig. 3, we find behind the inner faces of the dunes a low narrow marshy area in some places covered with several inches of water, in others barely wet. The principal trees of this marshy strip are the old field pine (*Pinus Taeda*), the palmetto, and in places that are only damp, the live oak. The palmetto can grow in quite wet soil and is frequently seen in standing water. *Cornus stricta* and *Baccharis halimifolia* are the principal marsh shrubs, but in places that are not too wet *Myrica carolinensis* also occurs. The following vines are luxuriant here

and cover the trunks of most of the trees: *Ampelopsis arborea*, *Parthenocissus quinquefolia* and *Gelsemium sempervirens*. *Berchemia scandens* is rare. In the shallow water grows *Hydrocotyle ranunculoides*, and on the damp borders are *Lippia nodiflora*, *Diodia virginiana*, *Micranthemum orbiculatum*, *Ludwigia virgata* and *Rubus trivialis*. The fern *Dryopteris Thelypteris* is found in considerable quantity in shallow water. Other herbaceous plants in this area were *Boehmeria scabra*, *Lactuca elongata*, *Polygonum setaceum* and *Bidens frondosa*. A species of *Lechea* was also plentiful. The beautiful malvaceous plant, *Kosteletzkya althaeifolia*, while not seen here, was found in a marshy place further inland.

The Forest.—In the forest which covers the whole interior of the island the trees are of vigorous growth, reaching a height of thirty to forty feet. The pines (*Pinus Taeda*) and oaks (*Quercus virginiana* and *Quercus laurifolia*) are the dominant forms, but a number of other species are more or less plentiful. Large specimens, 40 feet high, of *Juniperus virginiana* were seen, and the following, though not so large, reached the proportions of trees — *Persea Borbonia*, *Ilex opaca*, *Morus rubra*, *Osmanthus* (*Olea*) *americana*, *Celtis occidentalis*, *Prunus serotina*, *Bumelia tenax* and *Salix fluviatilis*. In sandy or damp places the palmetto forms a conspicuous part of the vegetation (Fig. 3). On the oaks the gray moss (*Tillandsia usneoides*) hung in long festoons, while mistletoe (*Phoradendron flavescens*) and the fern *Polypodium polypodioides* were not uncommon on the trees. The undergrowth was made up of the following shrubs, *Laurocerasus caroliniana*, *Callicarpa americana*, *Myrica carolinensis*, *Ilex vomitoria*, *Rhus copallina* and *Fagara Clava-Herculis*. In addition to these, *Osmanthus americana* and *Bumelia tenax*, already mentioned as trees, are more often found as shrubs in the undergrowth. The live oak, too, is frequently low and almost procumbent, forming a large part of the shrubby growth even under large trees of the same species. In the woods as well as near the dunes the woody vines are conspicuous. The yellow jessamine, the poison ivy and the Virginia creeper are abundant. *Berchemia scandens* was not so common. The principal herba-

ceous vines were *Willugbaeya scandens*, *Ipomoea speciosa* and *Galactia volubilis*. One specimen of *Vincetoxicum suberosum* was seen. Excluding the grasses the herbaceous undergrowth was very scarce. *Elephantopus carolinianus*, *Eupatorium leucolepis*, *Rubus trivialis*, *Galium hispidulum*, *Opuntia Opuntia* and *Ascyrum stans* were the only species noted. The most abundant grasses here were *Panicum lanuginosum*, *Eleusine indica*, *Sporobolus indicus*, *Uniola laxa* and *Paspalum altissimum*.

The Hammocks.— Just above the pavilion, which is about one and one-half miles from the western end, the forest narrows to a width of about 300 yards and assumes the character of hammocks. The trees become lower, more spreading, and less densely crowded. The dry sandy soil is often almost bare. A little shrubbery appears in scattered clumps, but grasses and vines

FIG. 4. Hammock vegetation, Isle of Palms, S. C. See page 144.

form most of the covering. The trees are principally live oak and laurel oak. Cedar, red bay and palmetto are occasional. The shrubbery is composed in great part of *Fagara Clava-Herculis* and *Ilex vomitoria*, with a little *Laurocerasus caroliniana*, *Bumelia tenax*, *Callicarpa americana* and *Myrica carolinensis*. *Yucca filamentosa*, *Opuntia Opuntia* and *Opuntia Pes-Corvi* appear

in the driest positions. The grasses are *Stenotaphrum americanum*, which is much used in Charleston as a lawn grass, *Cynodon Dactylon*, also a good lawn grass, *Leptochloa fascicularis*, *Sporobolus indicus* and *Panicum lanuginosum*. *Strophostyles helvola* and *Galactia volubilis* are the principal vines. The herbs noted were *Monarda punctata*, *Eupatorium leucolepis*, *Galium hispidulum*, *Bidens frondosa*, *Sanicula canadensis* and species of *Meibomia*. In Fig. 4 is shown a part of this hammock growth. In center is a live oak, with a cedar to left. The shrubs are *Callicarpa* to right, *Fagara Clava-Herculis* in front of oak, and *Myrica carolinensis* to left. In foreground is the grass *Leptochloa fascicularis*, through which is running the vine *Strophostyles helvola*.

The Salt Flats and Marshes.— On the north side of the island the character of the shore varies considerably. Towards the western end there is a low sandy plain just above high-tide mark which is covered with an association of *Iva frutescens*, *Borrichia frutescens* and several species of sedge. A few scattered clumps of *Myrica* project above the general level, and the pretty little *Sabbatia stellaris* adds dashes of color at intervals. Just beyond this sandy plain and separated abruptly from it by a line of drift is a low flat of sandy mud covered at high tide by a few inches of water. This flat is covered with a dense and beautifully level growth of *Borrichia frutescens* and *Sporobolus virginicus* in almost pure association. The *Borrichia* stood about one foot high, the *Sporobolus* about six inches. Among these was a little *Salicornia ambigua* and *Aster subulatus*. This growth ends abruptly and is followed by a dense strip of pure *Salicornia ambigua* about twenty feet wide. Adjoining this, in the black wet mud, commences the extensive marsh-grass (*Spartina patens*) flats which stretch across to the mainland.

Toward the east, the *Borrichia-Sporobolus* flat just mentioned ends rather abruptly in a slightly lower and more muddy area, when the growth changes quickly to an inner strip of *Spartina polystachya* and an outer strip of *Sporobolus virginicus*, both of quite pure growth. At one point on the back beach was noticed a fine lot of *Sesuvium Portulacastrum*.

Around a little garden back of the pavilion were found the following weeds: *Acalypha gracilens*, *Acalypha ostryaefolia*, *Pyrrhopappus carolinianus*, *Sida rhombifolia*, *Amaranthus spinosus*, *Datura Stramonium* and *Physalis pubescens*.

Following is the list of grasses and sedges collected on the island. Most of them were indentified by Professor A. S. Hitchcock, to whom I wish to express my thanks.

Cynodon Dactylon (L.) Pers.
Eleusine indica (L.) Gaertn.
Spartina polystachya (Michx.) Ell.
Panicum virgatum L.
Panicum lanuginosum Ell.
Panicum amarum Ell.
Panicum agrostoides Spreng.
Scleria triglomerata Michx.
Stenotaphrum dimidiatum (L.) Brong.
Phleum pratense L.
Sporobolus indicus (L.) R. Br.
Sporobolus virginicus L.
Fimbristylis spadicea (L.) Vahl
Leptochloa fascicularis (Lam.) Gray
Distichlis spicata (L.) Greene
Syntherisma filiforme (L.) Nash
Paspalum altissimum LeConte
Uniola laxa (L.) B. S. P.
Uniola paniculata L.
Cenchrus tribuloides L.
Spartina patens (Ait.) Muhl.
Cyperus pseudovegetus Steud.
Cyperus esculentus L.
Cyperus Nuttallii Eddy

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SHORTER NOTES

Names of Insects. — It is continually observed, that when entomologists have occasion to refer to plants, they seem to think that "any old name" will do. For example, Dr. H. G. Dyar has in Proc. U. S. Nat. Museum, 1902, an article on larvae of moths found in Colorado. The entomological part of the article is admirable; but some of the references to the plants on which the caterpillars fed are extraordinary. The queerest error occurs on page 409, where *Onosmodium* is metamorphosed into *Pnosmodium*, and a new moth bred from it is actually named *Gracilaria pnosmodiella* by Mr. Busck! Opposed as I am to changing the form of names, I shall feel obliged to refer to this insect as *Gracilaria onosmodiella*. Having admitted the sins o

entomologists (and I myself have sometimes been led astray), I must confess that botanists are rarely observed to err when referring to insects; but this no doubt is because they rarely refer to them. Unfortunately, the July issue of TORREYA, pp. 119–123, contains an article the entomology in which is no better than the botany in the paper cited above. The plant-louse called *Aphis crataegi* may have been *Macrosiphum crataegi* (*Siphonophora crataegi*, Monell, 1879), hitherto known from the Central States, or it may have been *Aphis crataegifoliae* Fitch, or *A. fitchii* Sanderson, or something else. That the ants were the Mexican *Myrmecocystus* (not "*Myrmicocystis*") *melliger* Llave, one may venture to doubt. *Podabrus pruinosus* LeConte (not "*pruniasus*") has long been known to be a synonym of *P. tomentosus* Say. It is *Coccinella*, not "*Coxinella*"; and *Diabrotica soror* is not a ladybird, but is a plant-feeder of the family Chrysomelidae.

T. D. A. COCKERELL.

BOULDER, COLORADO.

A NOTE REGARDING THE DISCHARGE OF SPORES OF PLEUROTUS OSTREATUS. — A few evenings since a friend brought me a fine plant of the above species, consisting of about twenty-five pileoli, growing from a common base and arranged in the form of a large rosette, about twelve inches in diameter and of about the same height. Knowing the plant to be very fresh, not yet forty-eight hours old, I decided to keep it and cook it upon the following day. For the night it was left upon my study table, in the same position in which it grew (gills downward). Early the next morning my attention was called to the plant by my wife who asked me to come and observe it. It happened to be exposed to a very strong morning sunlight, which entered the window three or four feet away. The spores were arising from the plant like tiny spirals of smoke or steam, to the height of two or three feet, making to us a very strange sight. At first I doubted if the "smoke" was really the spores, but after a careful microscopic examination of some which were caught upon a slide this point was definitely settled. Perhaps other agarics spore in a similar manner, but never having had conditions favorable before I cannot say. Certainly the fact was interesting to me and for this

reason I publish it. I have upon numerous occasions observed the momentary expulsion of spores from fungi such as *Bulgaria rufa* and *Sarcoscypha floccosa*, but with these plants the spore-discharge seems to occur when they are first touched, and then only.

C. C. HANMER.

EAST HARTFORD, CONN.,
July 27, 1905.

REVIEWS

Mutants and Hybrids of the Oenotheras*

The literature of mutation grows apace. One of the latest contributions to the subject is a publication of the Carnegie Institution of Washington with the above title. The work is copiously illustrated with many fine half-tone plates and cuts. Professor MacDougal a year or two ago secured seeds of *Oenothera Lamarckiana* and several other mutants from Professor de Vries in Amsterdam. In a carefully guarded and securely enclosed experimental ground at the New York Botanical Garden experiments were instituted to determine the influence of American conditions on the mutants of *Oenothera* secured by de Vries. The results of the work of Professor MacDougal to date constitute the basis of the report herein reviewed.

It was deemed important to establish the original habitat of *Oenothera Lamarckiana* if practicable. During the visit of Professor de Vries to America in the summer of 1904, a visit was paid, in company with the reviewer, to the herbarium of the Philadelphia Academy of Sciences, where a sheet considered to be that of *Oenothera Lamarckiana* was found, the specimen having been collected by C. W. Short near Lexington, Kentucky. The interest of a number of southern botanists was elicited in the search for the plant, but up to the present no living wild plants of *Oenothera Lamarckiana* have been found. In connection with this search, Professor S. M. Tracy rediscovered *O. grandiflora* in the original locality of Bartram. These discoveries, coupled with

* MacDougal, D. T., assisted by Vail, A. M., Shull, G. H., and Small, J. K. Mutants and Hybrids of the Oenotheras. Carnegie Institution of Washington, Publication No. 24. 1905. Papers of Station for Experimental Evolution at Cold Spring Harbor, New York. No. 2.

the experiments described below, indicate that there are two groups of evening primroses in the eastern United States: (1) *O. biennis*, *O. muricata*, *O. Oakesiana* and *O. cruciata*, with comparatively small flowers, in which self-pollination is possible and frequent; (2) *O. argillicola*, *O. grandiflora*, and *O. Lamarckiana* of a southern range and with flowers large and accessory structures favorable to cross-pollination.

The experimental work consisted in growing *Oenothera biennis* in order to observe the changes produced by cultivation. Careful measurements of the plants were made, and it was further established that *O. biennis* is capable of self-fertilization by reason of the superior length of the stamens. A new wild species, *O. argillicola* Mackenzie, was tested and its distinctive characters demonstrated. *O. cruciata* (Nutt.) Small, also, was grown in the experimental grounds, and the evidence at hand seems to confirm the suggestion as to the mutability of the species. It was, therefore, found important by the experimenters, aided by the critical descriptive study of the experimental plants by Miss A. M. Vail and Dr. J. K. Small, to give the characters of the forms of this species secured. Professor MacDougal has also been careful to hybridize *O. Lamarckiana* and *O. cruciata*, as well as *O. Lamarckiana* and *O. biennis*, *O. Lamarckiana* and *O. muricata*, in order to determine by this analysis the relationships between *O. Lamarckiana* and other species of the genus. It was shown that the hybrid progeny in the cultures, made in the New York Botanical Garden and in Amsterdam, included a series of types which ranged, in the aggregate of characters included, from those representing pure strains of both parents through goneoclinic forms to intermediates in which parental characters were, more or less, equally apparent. The experiments show also that the hybrid *O. Lamarckiana* × *O. biennis* includes four distinct and separate forms, none of which is identical with the unilateral monotypic hybrid obtained in the same cross in Amsterdam. Attention was paid to the occurrence of mutants among the hybrids, and with a description of these the first part of the paper closes.

The second part of the publication is a statistical comparison of *Oenothera Lamarckiana* with two of its mutants by Dr. G. H.

Shull, which shows that some of the unit characters of the mutants have a much greater variability than the corresponding features of the parent form, and the greater amplitude of the fluctuations is coupled with a decreased correlation. Thus the coefficient of variability of *nanella* is 31.84 ± 3.16 per cent., while of *Lamarckiana* it is 5.37 ± 0.44 per cent. The greater variability of the mutants does not, however, seem to result in any diminution of the gap that separates them from the parent form, and no movement in this direction has been observed in the long period which has elapsed since the new species came into existence. A bibliography is added.

JOHN W. HARSHBERGER.

UNIVERSITY OF PENNSYLVANIA.

PROCEEDINGS OF THE CLUB

WEDNESDAY, MAY 31, 1905

The meeting was held in the evening at the American Museum of Natural History, President Rusby in the chair and eleven persons present.

A report was received from President Rusby of the favorable action of the Council of the Scientific Alliance on Professor Richards' application for a grant from the Herrman fund. Attention was called also to the movement on the part of the Alliance toward raising a fund of $10,000, the income of which would be used to lighten the present assessments of the individual societies.

A communication from Dr. A. J. Grout, President of the Hulst Botanical Club of Brooklyn, requesting that it be allowed to coöperate with the Torrey Club in the excursions was referred to the Field Committee with power.

The following were elected to membership: Miss Madeline Pierce, Miss Mary McOuat, Miss Anna M. Clark, Miss Clara K. Hicks, Mr. C. C. Doorly, and H. J. Goeckel, Phar.D., New York City; Miss Dorothy Young, Passaic, N. J.; and Norman Taylor, Yonkers, N. Y.

On motion, a resolution was adopted authorizing the member-

ship committee, during the summer interruption of meetings, to receive applications for membership accompanied by the fee, and to accord such applicants all the privileges of regular membership.

The first paper on the scientific program was by Dr. C. Stuart Gager, and was entitled "Preliminary Notes on the Effect of Radio-activity on Plants." Plants grown in the presence of radium are subject to four different influences: (1) the α-rays, composed of a stream of material particles bearing a charge of positive electricity; (2) the β-rays, made up of a stream of particles 1/2,000 the size of those of the α-rays and carrying a charge of negative electricity; (3) the γ-rays, analogous to X-rays, but much more penetrating; (4) the emanation, which in a process of "decay" gives off α-rays as described, and eventually the β- and γ-rays mentioned above. The emanation behaves like a very heavy gas and may be condensed on a solid surface at a temperature of 150° C. The influence of radium upon plants, therefore, is of the nature of radiant energy.

The radium was employed in the form of the salt, radium bromide, of three strengths of activity, 1,500,000, 10,000, and 7,000, enclosed in sealed glass tubes; and also in the form of celluloid rods and cylinders covered with Lieber's radium coating of 10,000 and 25,000 activity. The glass shuts off practically all the α-rays; the β-rays penetrate through the glass more easily, while the γ-rays pass through glass very readily. By the use of the coated rods and tubes all three kinds of rays as well as the emanation are available.

The experiments indicate that the rays act as a stimulus, which varies in intensity with the strength and amount of radium used, the thickness of the seed-coats, distance of exposure and the intervention of moist soil between the radium and the plant. If the stimulus ranges between a minimum and an optimum, germination and subsequent growth are accelerated. Within these limits the rate of alcoholic fermentation is at first increased, but continued exposure may result in over-stimulation and consequent decrease in rate.

By over-stimulation, germination and growth of seeds, gemmae of Hepaticae, and pollen-grains are retarded and may be com-

pletely inhibited. Under the influence of the rays, chloroplasts change their position in the cell, as under too intense illumination, and they are eventually destroyed, as is embryonic tissue in stems and roots.

Results similar in kind to the above are obtained by the use of radio-tellurium in a sealed glass tube. The influence here is confined chiefly to the α-rays. Experiments with a rod coated with pollonium, which gives off α-rays exclusively, have thus far given negative results.

Growth is retarded and may be inhibited by growing plants in an atmosphere containing the radium emanation, such as may be drawn from a cylinder lined with Lieber's coating.

Photographs of the experiments, and specimens of the various radio-active preparations were exhibited. The paper was the occasion of considerable discussion. The second paper entitled "Some interesting Plants from Colombia" was by Dr. H. H. Rusby.

In view of the lateness of the hour Dr. Rusby stated that he desired to reserve his paper, as planned, for some future meeting when he could take the time to treat it more adequately, and for the present he would show some of the more interesting specimens and comment briefly upon them.

The collections were made by Herbert H. Smith, who spent four years collecting in the United States of Colombia near the town of Santa Marta, which is about fifty miles from the coast in the Sierra Nevada mountains. Although this territory was collected over quite extensively by Karsten, whose collections are at St. Petersburg and consequently not readily accessible, and by Wm. Purdy and various orchid collectors, Mr. Smith's efforts disclosed many novelties.

The total collection studied contained about 3,000 numbers, embracing between 2,300 and 2,400 species, of which number about fifteen per cent. are likely to prove new to science.

The specimens exhibited were most interesting, embracing arborescent Violaceae, handsome twining Bignoniads and Senecios, showy Vacciniaceae, numerous anomalous Compositae, and many other things unfamiliar to collectors in temperate climes.

Adjournment followed.

Edward W. Berry,
Secretary.

THE BOTANICAL SYMPOSIUM AT OHIO PYLE, PENNSYLVANIA

The second Botanical Symposium, held at Ohio Pyle, Pennsylvania, during the week of July 2 to 9, as announced in previous numbers of this Journal, was voted a great success by the thirty persons in attendance. That we should come so far was well appreciated by our Pittsburgh friends, who, although concentrating their efforts on "Pittsburgh Day," did much toward the general success of the meeting. Especial credit in this connection is due to the young ladies, some of whom seemed none the less attractive on account of their botanical innocence.

Ohio Pyle is a small village at an altitude of about 1,200 feet, situated among the western ranges of the Alleghany Mountains on the Youghiogheny River at a point where that tortuous stream almost forms a loop on itself by turning abruptly nearly backwards and after a course of several miles comes to within a few rods of the point of departure, but some 80 feet nearer sea-level; in this distance it tumbles over a very pretty "falls" and traverses a series of mad rapids, the rocky banks of which are frequently inundated for short periods. The sandy pockets of these banks are exceedingly rich in plants, many of them of great interest and often of southern affinities.

The more precipitous places are covered by a mass of *Rhododendron maximum*, at this time gorgeous in its profusion of bloom. The so-called peninsula formed by the bend of the river is a low flat forest of oak and chestnut, with a goodly number of cucumber and tulip trees interspersed and an occasional white pine and hemlock on the margin. Here many interesting plants are found but at this time the forest was especially attractive to the mycologists on account of the richness of its fungus flora, which had been brought out by the copious rains of the previous weeks. The steep and rocky mountain-sides and the brooklets on the opposite sides of the river furnished much additional variety.

The most interesting trees were the Alleghany birch, cucumber tree and Pennsylvania maple; of shrubs, there were *Pyrularia*

pubera, *Spiraea virginiana*, *Ilex monticola* and *Dirca palustris.* Herbaceous plants of interest were *Arisaema Stewardsonii*, *Cimicifuga americana*, *Aconitum uncinatum*, *Trautvetteria carolinensis*, *Ranunculus alleghaniensis*, *Adlumia fungosa*, *Heuchera Curtisii*, *Saxifraga micranthidifolia*, *Dalibarda repens*, *Scutellaria saxatilis*, *Houstonia serpyllifolia*, *H. purpurea* and *Marshallia grandiflora*; among the pteridophytes, *Camptosorus rhizophyllus*, *Asplenium pinnatifidum*, *A. montanum* and *Lycopodium tristachyum.* The violaists found much of interest, but the crataegists saw very little in their line except a type bush of one of Mr. Ashe's species. The bryologists were overwhelmed with the abundance and variety of their favorites. The mycologists were simply deluged with species and individuals, but lichens were very scarce and algae almost entirely absent. A full list of the plants noted is to be published by Recorder Crawford at a later date.

The headquarters, the Rainier Hotel, an ancient summer resort with an air of abandonment quite suitable to the occasion, was all that could be wished for, especially as we were in advance of the season and had the place practically all to ourselves. The large pavilion in the grove was provided with a musical instrument and an abundance of tables and chairs—this was taken advantage of by the mycologists, who installed a "mushroom exhibit" in which about seventy-five species were shown under proper labels. Here, too, in the open, in fact right in the forest, our evening meetings were held; these should be attended to be appreciated,—their instructiveness, informality and mirth are beyond my poor descriptive power. Refreshments, from a mysterious source, such as candy, lemonade and ice-water were frequently passed around, while the absence of the mosquito was remarked by our friends from New Jersey. Our disappointment, however, was the failure of the mycological contingent to "make good" their "mushroom feast."

The peculiar success of these meetings is to be attributed, beyond a doubt, to their total lack of formality — the only vestige of which was due to a conspiracy of the "inner man" and the hotel management, which required that each one should report at the dining hall, in person and at stated intervals, but we know of

no instance in which that was particularly objected to. On the whole, this meeting seemed to demonstrate that a considerable party could go on a week's herborizing, in quest of recreation, with as much success as if hunting, fishing or lounging at the seashore. It showed that a widening of the scope of territory covered was thoroughly practicable. It indicated that the symposium as the occasion of a mid-summer gathering or reunion of botanists is now assured and it proved that an absolutely informal gathering is not only most desirable but eminently successful.

It was decided to hold the next meeting somewhere in the highlands of New York, so as to make it practicable for the New England botanists to avail themselves of an invitation to join us, and it is predicted that next year's symposium will prove even a greater success; at all events we all promised ourselves to be on hand in 1906.

J. A. Shafer.

NEWS ITEMS

J. Franklin Collins was appointed assistant professor of botany in Brown University at a meeting of the corporation of that institution held on June 22, 1905.

Dr. George T. Moore has resigned his position as algologist and physiologist in charge of the laboratory of plant physiology, Bureau of Plant Industry, U. S. Department of Agriculture.

Mr. Otis W. Barrett has resigned his post as entomologist and botanist of the Porto Rico Agricultural Experiment Station and has been appointed "plant introducer" in the Bureau of Plant Industry, U. S. Department of Agriculture.

Dr. John Hendley Barnhart, editor-in-chief of the publications of the Torrey Botanical Club, who attended the recent International Botanical Congress at Vienna as delegate from the New York Botanical Garden, returned to New York on August 2.

Vol. 5 No. 9

TORREYA

September, 1905

ORIGIN OF RHUS BIPINNATA

By Edward L. Greene

From the annals of botany and of horticulture a list of some length might be made of so-called varieties of trees and shrubs, each differing from its specific type by more or less deeply cut or cleft leaves or leaflets ; and the varietal name *laciniata*, by the way, is almost uniformly employed to designate this kind of morphological aberration. One meets with it in genus after genus, and it is found associated with the mutations of more than one species within the same genus, as in the case of *Rhus*, when we have *Rhus glabra laciniata*, and an earlier *Rhus typhina laciniata*.

Heretofore this not unusual type of variability has not seemed significant to botanists, if one may judge by the brief and slighting allusions made to them in our books of botany, where they are apt to be treated as if not deserving varietal names ; so that for any even half-adequate account of them one must consult books or journals of horticulture — this even in the case of *Rhus bipinnata*, which originated not under cultivation, but was found wild in the woods of eastern Pennsylvania ; a shrub so widely at variance with its nearest allies that the finder did not even guess it to be a *Rhus* at all.

In the light of the mutation theory, newly advanced and already meeting with wide acceptance, the class of morphologic deviations to which this fine sumac belongs attains a new significance. Every such plant deserves from systematic botany better treatment than that of being passed by without a name.

In the heading of these notes I shall seem to have promised an account of the origin of the form under consideration. But my meaning is rather to indicate how far we are from knowing how the shrub originated ; hoping, however, to incite those living

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near its original habitat to make, if it be not too late, a thorough investigation of the matter.

The earliest mention I find made of this sumac in any book of botany is that by Darlington,* who gives an excellent description of its characters, as far as known ; and this is the most respectable mention I find of it in any flora. The locality where it was found is within the limits of Chester County, where Darlington lived ; but it does not appear that he ever sought it out in its wild state. Its discoverer was Mr. Kilvington, concerning whom I obtain the information through Mr. Meehan : "Concerning Robert Kilvington ; our Mr. Joseph Meehan recalls him perfectly and says that he lived on Woodland Avenue, West Philadelphia. He and his generation, however, have passed away. Kilvington was a botanist of considerable local note, and his attainments were highly appreciated by those who knew him. He was a private gardener for a time near Philadelphia, later going into business for himself as a florist." †

According to the late Thomas Meehan ‡ Mr. Kilvington must have cultivated and propagated his fine discovery, though into southern Europe, where it was greatly prized, it was introduced by the botanist Elias Durand, of Philadelphia ; § and ten years after it was first described, but namelessly, by Darlington, Carrière named and described it as *Rhus glabra laciniata.* Only a few of the leaflets in even Carrière's figure are properly laciniate, most of them being pinnately divided, so that the foliage as a whole is, as Darlington said, bipinnate ; and in the considerable number of herbarium specimens now before me, from various gardens, all the leaves have pinnate leaflets, none being merely laciniate.

It is of touching personal interest to know that this beautiful mutation has been planted at the grave of Dr. Darlington, who gave the earliest account of it ; for I find, in the herbarium that belonged to the late M. S. Bebb, and which is now the property

* Flora Cestrica, 3d Ed., 457. 1853.

† S. Mendelsohn Meehan in litt., Aug. 22, 1905.

‡ Gardener's Monthly **18** : 355.

§ Carrière, Rev. Hort. 1863 : 7.

of the Field Columbian Museum, a large leaf of it, the sheet on which it is mounted bearing the following legend in Mr. Bebb's hand :

"In September, 1863, I made an excursion to the pine barrens of New Jersey and far down along the eastern shore of Maryland, my companion and very helpful guide to localities of special interest being my friend William M. Canby. Together we visited the grave of Dr. Darlington, and finding this shrub growing upon it, I took a single leaf as a memento." *

It seems as if it would be a worthy undertaking on the part of some of the botanists of eastern Pennsylvania to investigate this shrub, so interesting as to the problem of its derivation. It would certainly be well to explore its original habitat, or any other that may chance to have been recorded, with a view to determining whether it seems to have originated as a seedling from *R. glabra* or as a mere offset from another individual.

I find no record in either botany or horticulture of the shrub's having borne flower or fruit; but in the National Herbarium we have a specimen communicated long ago by Mr. Commons, of Delaware, which bears a panicle of immature fruit. This sample was taken from a cultivated specimen, but where it was grown is not indicated.

U. S. National Museum.

NEW FASCIATIONS

By J. Arthur Harris

Perhaps the most common of all structural anomalies is that known as fasciation. Occurring in so many forms as it does, it is familiar to everyone and requires no description. In some species, as in the sweet potato and the coxcomb, it is to be observed with such frequency as to almost deserve the designation of a varietal characteristic.

The following cases of fasciation, most of which are not described in Penzig's admirable compendium of vegetable teratology,

* Herb. Field Mus., sheet 14074.

have come to my notice and are presented in the thought that they may have a statistical value.

The anomaly is very frequent in the inflorescence of *Ambrosia trifida* and *A. bidentata*, usually leading to a terminal division of the inflorescence.

In two specimens of *Centaurea Moschata*, pronounced fasciation of the stem was noticed, beginning near the base and extending to the tip. In one case the stem reached the breadth of about five-eighths inch. At the top was produced an inflorescence which was necessarily much convoluted, forming more than one complete turn and having a length of nearly five inches (taking the measurement at the contracted portion of the involucre, the narrowest portion of the head, and not from the tips of the expanded florets) as compared with a width of about a quarter of an inch, the thickness of the head being slightly over one-half inch. The second case was very similar in nature, but the phenomenon was not so marked. Penzig gives for *C. nigrescens:* "Eine Art Fasciation der Stängelspitze, mit drei verschmolzenen Inflorescenzen ist * * * erwähnt." De Candolle in his Organographie Végétale, figures a fasciated stalk of *C. Scabiosa* bearing at the tip two distinct and apparently normal inflorescences. The present inflorescences were apparently normal except for their greater diameter in one direction.

Slight fasciation of the stem was noticed in *Coreopsis tinctoria atropurpurea.*

In the herbarium of the Missouri Botanical Garden is a fine fasciated specimen of *Dioscorea divaricata* collected on the grounds in 1898 by Mr. J. B. S. Norton. Brongniart * records the fasciation of the whole climbing stem of this species. Penzig gives other examples of torsion and fasciation.

A head of *Helianthus* sp. sent from Florahome, Fla., by T. Tilden, Jr., shows a broad fasciation of the head and of the stem for some distance. Fasciation in *Helianthus* has several times been noted in the literature.

Several more or less extensively fasciated stalks of *Hibiscus Moscheutos* were noticed in a group of plants cultivated in the Missouri Botanical Garden and in Tower Grove Park.

* Bull. Soc. Bot. France 12: 49. 1865.

Fasciation of the stem in the Convolvulaceae has been several times noted in the literature. I have seen it in *Ipomoea pandurata* and in the sweet potato, where it may almost be regarded as a normal occurrence.

Conard * has published detailed observations on the phenomenon. He attributes the first published notice to Macfarlane,† apparently not being aware of the much earlier observation of Fermond,‡ who describes a fasciation of one meter in length and ten to twelve centimeters in width.

Fine examples of fasciation were noticed in sprouts from the stump of a tree of *Melia Azedarach* ten or fifteen feet in height which had been winter-killed the preceding winter. Fasciation has already been described for this species.

It is hardly necessary again to record branching of the spike of *Plantago lanceolata*.

Dudley § states that the spike of *Plantago Rugelii* is frequently fasciated at the tip and Gerard || records more or less branched spikes. I have frequently noticed spikes which were fasciated or in which the fasciation had extended to apical branching.

Fasciation of the stem was noticed in a vigorous young plant of *Rhus typhina*. Penzig records fasciation in the twig of *R. glabra*.

The leaves of *Silphium trifoliatum* are described as in whorls of three or four. One bed of plants in the Missouri Botanical Garden showed leaves arranged largely in whorls of five, those of three and four being found much less frequently. Some of the stems were markedly fasciated toward the tip. One stalk of *Silphium integrifolium* with 3-whorled leaves was found at Meramec Highlands.

Fasciation in the stem is again noticed in *Spinacia oleracea*. Marked fasciation of the stem of *Stephanotis floribunda* was noted for me by Mr. G. E. McClure. Fasciation of the spike of *Ver-*

* Conard, H. S. Fasciation in the Sweet Potato. Contr. Bot. Lab. Univ. Penn., **2**: 205–213. *pl. 19.* 1901.

† Macfarlane, J. M. Science II. **5**: 940. 1897.

‡ Fermond, Ch. Essai de Phytomorphie, **1**: 299, 301. Paris, 1864.

§ Dudley, W. R. The Cayuga Flora. Bull. Cornell Univ. **2**: 64. 1886.

|| Gerard, W. R. Bull. Torrey Club **7**: 67. 1880.

bena stricta with sometimes a division into two similar branches was not uncommon during August, 1902.

A fasciated specimen of *Vernonia angustifolia* is preserved in the Missouri Botanical Garden herbarium.

THE LIBRARY, MISSOURI BOTANICAL GARDEN.

NOTE ON BOTRYCHIUM VIRGINIANUM (L.) SW.

BY IVAR TIDESTROM

The species of *Botrychium* often present interesting modifications of their normal form; they seem to vary as to form between very wide limits and their variations appear to be independent of climatic or other conditions. This became obvious to me while out on a collecting trip along the western shore of Chesapeake Bay, some thirty miles east of Washington. Along with typical forms of *B. virginianum* grew the slender form described by Pursh under the name of *B. gracile* [Pursh, Fl. Am. Sept. **2**: 656. 1814]. Some very large plants were also found, one of which is nearly 5 dm. high. Plants of this size are often found in the shaded ravines in the Potomac basin, which region appears to be a choice locality for this species. The most interesting form, however, was discovered among a number of normal plants at Chesapeake Beach, Md. It is represented in Fig. 1. Only one specimen was discovered; it proved interesting in having two fertile pinnules on the sterile segment — a case which is rarely met with in this species; the forking sporophyll and the two normal panicles are also interesting. Mr. Homer D. House informs me that the latter deviation from the normal form is not so rare.

As this species is very common in low woodlands, it is within easy reach of botanists and is well worthy of study. Some interesting data might be gathered and added to the history of this, our finest species of *Botrychium*.

Of other species, the following have been recorded as occurring within the limits of the Washington Flora: *B. neglectum* Wood, of which a single plant was discovered by Mrs. E. S.

FIG. 1. A form of *Botrychium virginianum*.

Steele, within four miles of this city ; *B. dissectum* Spreng. is frequent in rich woodlands ; *B. obliquum* Muhl., occurring in low damp woods, is not so common.

I am indebted to Messrs. R. V. Bailey and H. Hungerford for the photograph of *B. virginianum.*

WASHINGTON, D. C.,
May 29, 1905.

SOME LARGE SPECIMENS OF SMALL TREES IN GEORGIA

BY ROLAND M. HARPER

Two winters ago while collecting timber specimens in Georgia I came across some unusually large examples of four species which are ordinarily shrubs. The following notes on them may be of interest.

RHUS COPALLINA L.

About two years ago * I reported the occurrence of arborescent specimens of this on the banks of the Chattahoochee River in Early County near Saffold, at or near the inland edge of the Lower Oligocene region of the coastal plain. In February, 1904, I revisited the spot and found more of them (the fact that there are almost no evergreens on alluvial banks in that part of the country making it easier to see the trees in winter). The trunk of the largest specimen observed was eleven inches in diameter near the base, but as it forked about three feet from the ground (see Fig. 1) I had to select a smaller one for the collection. The largest specimens averaged about thirty feet tall.†

On March 26 I saw along the bluff of McBean Creek in the southeastern corner of Richmond County a specimen of *R. copallina* which I estimated to be forty feet tall. Its trunk was only six inches in diameter.

* Bull. Torrey Club 30 : 291. 1903.

† I looked in vain for the large specimens of *Aralia spinosa* which I had seen near the same place in 1901, and was afterward informed that the demand for the bark ("prickly-ash bark") as an ingredient of some patent medicine had caused their destruction between my two visits.

Rhus glabra L.

This does not seem to be classed as a tree in any of the books. In December, 1903, I frequently found specimens over three inches in diameter and twenty feet tall growing on the Cambrian shales along the Oostanaula and other streams in Gordon County, and on January 5, 1904, I found on the same formation, in a cane-brake on the bank of the Coosa River, in Floyd County, about twelve miles below Rome, veritable little grove of this species, in which many of the specimens were as much as seven inches in diameter and thirty feet tall, with the lowest branches higher up than I could reach. These trees seemed perfectly sound and healthy, and I cut a log from one of them which astonished even the natives who saw me wrapping it up for shipment.

FIG. 1. Trunk of *Rhus copallina*, 11 inches in diameter. Early County, February, 1904.

This species is readily distinguished from *R. copallina* in winter by several characters which are rarely if ever mentioned in descriptions. These characters may be contrasted as follows:

R. glabra	*R. copallina*
Heart-wood deep yellow, sharply distinguished from the narrow white sap-wood.	Heart-wood pale greenish-yellow, not sharply distinguished from the sap-wood.
Fruiting panicles erect.	Fruiting panicles drooping.
Drupes bright scarlet.	Drupes dull dark-red.

There are also some differences in the bark, almost impossible to describe.

The natives in northwest Georgia commonly call *R. glabra* "red sumac" and *R. copallina* "black sumac," doubtless on account of the difference in color of the fruit.

Ilex myrtifolia Walt.

In the swamp of the Suwannee River (rather an unusual habitat for it) in Clinch County I noticed in February, 1904, some specimens of this handsome little tree about thirty feet tall, with trunks a foot in diameter, though this species has not hitherto been recognized as a member of our sylva. During the same winter and following spring I noticed other arborescent specimens of it, in pine-barren ponds, in Sumter, Berrien, Lowndes, Clinch, Ware, and other counties in the coastal plain.

A characteristic feature of this species is that its trunk is never strictly erect, but always ascending or curved.

Staphylea trifolia L.

This too does not seem to have ever been credited with becoming a tree. On January 7, 1904, I found one specimen on the right bank of the Etowah River in Floyd County about four miles above Rome, on the Knox Dolomite (Lower Silurian) formation, which had a straight erect trunk five or six inches in diameter, with the lowest branches about six feet from the ground. There were a few shrubby specimens of it near by, but apparently no other arborescent one.

Specimens of these four little trees formed part of Georgia's exhibit at St. Louis last year, and are now presumably in the forestry collection in the state capitol in Atlanta.

College Point, New York.

COTYLEDON- AND LEAF-STRUCTURE IN CERTAIN RANUNCULACEAE

By Neata Clark

This paper covers a brief study of the leaves and cotyledons of four of the *Ranunculaceae*, viz.: *Aquilegia coerulea* James, *Anemone multifida* Poir., *Pulsatilla hirsutissima* (Pursh) Britton,

and *Oxygraphis Cymbalaria* (Pursh) Prantl. The work was done at the suggestion of Professor Francis Ramaley.

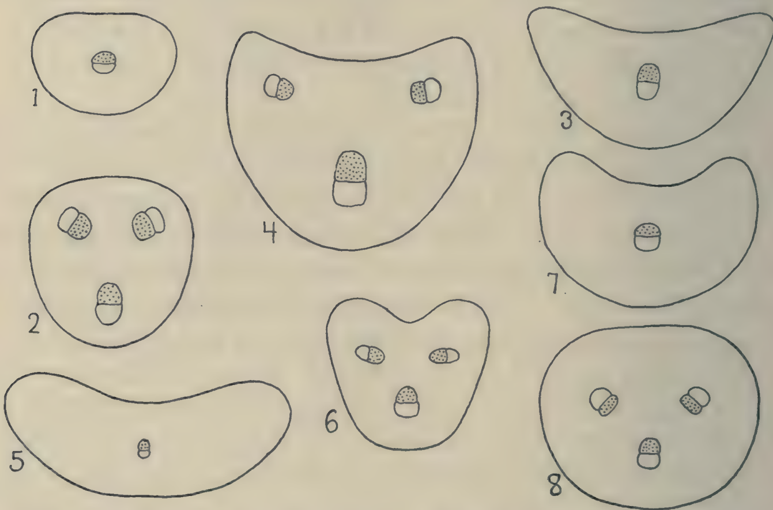
The cotyledons in the four species examined are all more or less ovate in outline, being of the usual Ranunculaceous type. The leaves in the first three species are much cut and divided while in *Oxygraphis* they are cordate-ovate with much branched veins. In no case does the cotyledon resemble the leaf in form. In *Oxygraphis Cymbalaria* the cotyledon-stalks are connate from their bases almost to the blades.

No constant difference of striking character was noticed in the epidermis of cotyledons and leaves. However, it was seen that the number of stomata was much smaller for a given area of cotyledon than for a similar area of leaf surface. No stomata were seen in the upper epidermis of either leaf or cotyledon of *Aquilegia coerulea*. "Twin stomata," *i. e.*, stomata in contiguous pairs, were seen in the lower epidermis of both leaf and cotyledon in this species. In the literature at hand there seems to be no mention of this peculiarity as having been noted in Ranunculaceae. Long, simple hairs occur on the under surface of the cotyledon of *Pulsatilla hirsutissima* and on both surfaces of the leaf.

In the internal structure of leaf and cotyledon the one-row palisade is characteristic of all, the single exception is the cotyledon of *Oxygraphis* in which the palisade might be described as two-layered. The spongy tissue of the cotyledons corresponds to that of the leaves, especially in the shape of the cells and in the size of the air-spaces. The vertical sections, excepting in *Pulsatilla hirsutissima*, showed about the same thickness, but in that species the cotyledon was about twice as thick as the leaf. This difference in thickness is brought about by the greater size of the cells in the cotyledon.

The leaf-petioles are quite different from the cotyledon-stalks in the four species. Figures 1 to 8, which are diagrams of cross-sections, show these differences plainly. In each case the leaf-petiole is somewhat cylindrical with about three vascular bundles while the cotyledon-stalk is more flattened and has only a single small bundle. Figures 1 and 2 are of *Aquilegia coerulea*, figures

3 and 4 are of *Anemone multifida*, figures 5 and 6 are of *Pulsatilla hirsutissima* and figures 7 and 8 are of *Oxygraphis Cymbalaria*. As above noted, the cotyledon-stalks in the last-named species are connate for nearly their entire length. This species should, therefore, be added to the list * published by Miss Sar-



FIGS. 1–8. Sketches illustrating cotyledon- and leaf-structure in *Aquilegia*, *Anemone*, *Pulsatilla*, and *Oxygraphis*.

gant, of plants in which the cotyledon-stalks form a petiolar tube.

On the whole, it may be said that while there are slight differences in the epidermis of cotyledons and leaves and in their internal structure, yet the greatest differences are in the leaf-petioles and cotyledon-stalks. The differences, recorded here for these species of Ranunculaceae, are on the whole, much the same as those previously noted in other plants by Ramaley.†

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* Annals of Botany **17** : 73. 1903.

† Minn. Bot. Studies **2** : 417. 1900; also, University of Colorado Studies **2** : 255. 1905.

SHORTER NOTES

LESPEDEZA VELUTINA BICKNELL A HOMONYM. — Instances are not rare in which a homonym is published so soon after the first use of the name that the occurrence can scarcely be laid to negligence on the part of its author in selecting a valid name. The following case appears to be one of such instances.

Lespedeza Bicknellii nom. nov.

Lespedeza velutina Bicknell, Torreya **1**: 102. 28 S 1901. Britton, Manual 1048. O 1901; ed. 2, 1068. 1905.

Not *Lespedeza velutina* Dunn; Hooker, Icones Plantarum **7**: *pl. 2700.* F 1901. A native of China.

The type of *L. velutina* Bicknell and therefore of *L. Bicknellii* is, "from Woodlawn, N. Y. [E. P. Bicknell], August 28, 1898, flowers; September 25, 1898, fruit: in the herbarium of the New York Botanical Garden." H. D. HOUSE.

WASHINGTON, D. C.

REVIEWS

English Edition of Goebel's Organographie der Pflanzen*

The English form of Professor Goebel's important work, which has been awaited for several years, has at last been completed, and the second part is now issued and is the most recent publication of classical botanical productions which the Clarendon Press has given to the English-speaking world. While the discrepancy of time between the appearance of the second part in the two languages is rather long, we remember that the translation has been a task of no mean magnitude.

The botanists of the present moment are at a point in the history of their science which is unique. Looking backward we may see that, at the beginning of what we may call modern botany, all its students trod the same path. During this period the science was purely descriptive of the externals of the plant

* Organography of Plants, especially of the Archegoniatae and Spermophyta, by Dr. K. Goebel, Professor in the University of Munich; authorized English edition by Isaac Bayley Balfour, King's Botanist in Scotland. Part I., General Organography, i–xvi + 1–270, *f. 1–130.* 1900. $3.10; Part II., Special Organography, i–xxiv + 1–708, *f. 1–417.* 1905. $7.00; royal 8vo. Oxford, Clarendon Press.

organism. Occasionally, men in other fields of scientific work attempted to solve some of the riddles of internal structure and of physiology, but when they claimed admission to the ranks of the botanists they were regarded as interlopers. Botany remained for a time a virgin science, whose fecundity was revealed only after union with physics and chemistry. From the time when the botanist accepted the wider definition of his science, the original path became divided at first into two, one of which was directed toward the goal of physiology and the other toward that of description. The latter trend of study led to the necessity of common descriptive terms and of this necessity was produced a morphology which culminated in classification of plant parts by referring them to a "few elementary forms" which forms, however, have a subjective reality only. This is the idealistic morphology of Goethe, which in its time served well its purpose. The "uniformity" of life discovered by this morphology was a conception which prepared the mind for the theory of descent, under which the variety of organic life could be subsumed. It soon overleaped itself, however, and became a mere formalism. The plasticity of nature was lost sight of in the rigidity of subjective conceptions. So markedly true has this been in some quarters, that the belief is held to with a tenacity which would be more praiseworthy if exerted in a better cause, that the sole business of morphology is to say that things are so rather than how they come to be so. There are certainly two ways of viewing an organ. We may look at it simply as such, restricting our legitimate curiosity, and contenting ourselves with a mere description of it; and then we may search about in the limitless field of observation, and when we find a similar form, seize upon it, and with a sigh of satisfaction, call it a homology, thinking our task done, much as a curiosity collector does in finding a particular object of his cupidity. Or we may see in form a measurable expression of forces at work in the living organism; we may by experiment get at some more adequate notion of its service in the economy of the plant; we may by searching find out why similar forms are produced in different organisms and why in similar organisms, different structures are

produced; in this way we may get at some conception of why the plant is as it is. These are the real aims of causal morphology. "Even if we had the story of development spread out clearly before us, we could not content ourselves with the simple determination of the same; for then we should be constrained to ask ourselves how it has been brought about." In the realm of plant morphology, therefore, the point of view of physiology helps us to see that by the method of causal morphology we may ultimately attain to the knowledge which we seek.

The chief prophet of causal morphology is Goebel, and the "Organography" is his prophecy. There are few books so rich in observation and so suggestive of discovery as his. The sharp delimitations drawn between our knowledge and our ignorance, the fearless denunciation of self-delusion, make this task well worth the sustained effort which it cost the author. It will be most regrettable, now that the results are available in English as well as German, if the coming years do not bring a harvest to the master workman. We believe that no book of the present day is of deeper significance for the development of botanical knowledge. We can only feel a certain disappointment that the task became, in its latter part, so very great that the author was compelled, by circumstances, some of which were beyond his control, to curtail a portion which would have been of much greater value if it had been treated more at length.

F. E. LLOYD.

NEWS ITEMS

The September *Journal of Botany* announces that owing to ill health Mr. George Murray has resigned the keepership of the Department of Botany of the British Museum.

Dr. and Mrs. N. L. Britton, of the New York Botanical Garden, and Mr. Stewardson Brown, of the Academy of Natural Sciences of Philadelphia, were in Bermuda for the first three weeks of September.

Mr. Edward W. Berry, secretary of the Torrey Botanical Club, has removed to Baltimore, where he will be engaged in palaeobotanical work for the Maryland Geological Survey, with headquarters at Johns Hopkins University.

Professor Ellis A. Apgar, for twenty years state superintendent of public instruction of New Jersey, and one of the authors of "Apgar's Plant Analysis," died in East Orange, N. J., on August 28, at the age of seventy years.

Dr. W. A. Murrill of the New York Botanical Garden, and Mr. P. L. Ricker of the Bureau of Plant Industry, U. S. Department of Agriculture, devoted a month in August and September to the collection and study of fungi in the Mt. Katahdin region of Maine.

Dr. Burton E. Livingston of the Bureau of Soils, U. S. Department of Agriculture; Dr. Forrest Shreve of Johns Hopkins University, and Professor Elias J. Durand of Cornell University, have recently spent a few weeks in special studies at the New York Botanical Garden.

Professor L. M. Underwood, of Columbia University, returned from his summer's visit to Europe on September 18. After attending the International Botanical Congress in Vienna, several weeks were given by him to the study of the fern-collections at Prague, Berlin, Paris and Kew.

Professor Francis E. Lloyd, of the Teachers College, Columbia University, returned to New York late in August after a summer's work at the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona, where he was engaged chiefly in a study of transpiration of xerophilous plants.

Dr. C. Stuart Gager, recently assistant in the laboratories of the New York Botanical Garden and acting professor of botany in Rutgers College, New Brunswick, New Jersey, has accepted an appointment as teacher of biology in the Morris High School, Borough of the Bronx, New York City.

Mr. George V. Nash of the New York Botanical Garden, returned on September 8 from a six weeks' visit to Haïti, bringing with him a large quantity of herbarium material, living plants, seeds, etc. On the return voyage ten days were spent on the Grand Turk of the Turks Islands group, where Mr. Norman Taylor, who accompanied Mr. Nash, remained for two weeks longer.

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TORREYA

October, 1905

NOTES ON THE GRAY POLYPODY

By Ivar Tidestrom

Marginaria polypodioides (L.)

Acrostichum polypodioides L. Sp. Pl. 1068. 1753.
? Polypodium virginianum L. *l. c.* 1085. [Syn. Plumier only.]
? Polypodium ferruginosum L. Sp. Pl., ed. 2, 1525. 1763.
Polypodium incanum Swartz, Prodr. 131. 1788.
Polypodium ceteraccinum L. C. Rich; Michx. Fl. **2**: 271. 1803.
Goniophlebium incanum J. Sm. Jour. Bot. **4**: 56. 1841.
Lepicystis incana J. Sm. Cult. Ferns, 2. 1857.
Polypodium polypodioides A. S. Hitchc. Rep. Mo. Bot. Gard. **4**: 156. 1893.

The history of this little fern, its variations in form, and its geographical distribution, are of great interest to botanists.

The plant was without doubt first recorded by Plukenet [Phytogr. *pl. 89. f. 9.* 1691] under the name *Filicifolia s. Polypodium tenuifolium minus Virginianum*, and later enumerated in Almag. Bot. 153. 1696. Plukenet cites as a possible synonym "*Caticaá s. Polypodium Brasiliense Pisonis* [lib. iv., fol. 233] but since the latter author describes his plant as having "*caules cubitum alti*," its identity must be questioned.

Polypodium radice tenui & repente of Plumier [Descr. Pl. Am. 25. *pl. 36.* 1693, and Fougères de l'Amer. 60. *pl. 77.* 1705] reported from San Domingo, and *Polypodium minus*, etc. [Sloane, Cat. Pl. Jam. 16. 1696, and Nat. Hist. Jam. **1** : 79. 1707] refer also to our plant. Plumier says of this fern "*J'ay rencontré plusieurs fois cette Plante dans les forests de l'isle Saint Domingue. C'est le petit Polipode à pinnules rares & cendrées par dessous du S^r. Sloane Cat. Plant. Jamaic. 16.*"

The name given to it by Morison [Pl. Hist. **3**: 563. sec. 14.

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pl. 2. f. 5. 1715] is also characteristic: *Polypodium minus Virginianum foliis brevioribus subtus argenteis;* he says of his plant "*Elegantem hanc speciem è Virginia acceptam habemus.*" It is recorded from this region also by Gronovius [Fl. Virg. **2**: 198. 1743] who described it under the name *Acrostichum fronde pinnata,* etc.

In 1753, Linnæus described the species under the name *Acrostichum polypodioides* but it is well-nigh certain that Plumier's synonym cited under *Polypodium virginianum* properly belongs here. Linnæus' remark, however, under the latter species, "*antecedenti* [*i. e., P. vulgare*] *simillima, sed minor, & subtus glabra*" pertains undoubtedly to some small form of *P. vulgare,* so common in the Potomac Valley and elsewhere. This view was held by the illustrious Willdenow, who makes this statement in regard to *P. virginianum:* * * * "*Ex America boreali semper P. vulgare sub hoc nomine accepi.*" [Willd. Sp. Pl. **5**: 174. 1810.]

The Jamaican plant described by Patrick Browne and named *Polypodium ferruginosum* by Linnæus [Sp. Pl., ed. 2, 1525. 1763] has been referred by later authors to the species in question.

Swartz described the species from the West Indies under the name *P. incanum* [Sw. Prodr. 131. 1788; Fl. Ind. Occ. **3**: 1645. 1806; Syn. Fil. 35. 1806] giving as hab. "*adnascitur truncis vetustis in montibus summis Jamaicae.*"

We find the plant under still another name, *P. ceteraccinum,* in the works of Michaux [L. C. Rich.; Michx. Fl. **2**: 271. 1803] who records it as "*parasiticum in Kentucky, Tennassée, Florida.*"

Bory de Saint-Vincent included the species in his genus *Marginaria* [Dict. Class. Hist. Nat. **6**: 587. 1824; **10**: 176. 1826], which name is evidently the earliest generic name for Polypodium species having scaly fronds and the sori along the margin. In 1828, the same author applies this generic name to one of his species *Marginaria minima* [Duperrey, Voy. **2**[1]: 264. *pl. 31. f. 2.* 1828] of which he says: * * * "*très voisine de celle que les botanistes ont communément appelée Polypodium incanum, a été confondue avec elle. Elle en diffère cependant en ce qu'elle est trois ou quatre fois plus petite et d'un aspect bien plus élégant.*"

It is therefore quite evident that the generic concept of *Marginaria* Bory applies to such plants as the species in question

FIG. 1. The Gray Polypody, *Marginaria polypodioides*, from near Washington, D. C.

and, since this group has been recognized as distinct from the *Polypodia*, the genus *Marginaria* Bory merits recognition. J.

Smith referred this group to *Goniophlebium* (§ *Lepicystis*) [Jour. Bot. **4**: 56. 1841.] and to genus *Lepicystis* in 1857 [J. Sm. Cult. Ferns 2]. The latter genus has been adopted by Diels [Engl. & Prantl, Nat. Pflanzenfam. **1**^{4}; 322. 1899] but in a wider sense. In both instances, the scales on the surface of the frond serve as the principal distinguishing character.

The geographical range given for this species extends from the southern United States to Chile and Argentina, and in Africa from the Cape of Good Hope to the Zambesi region. The African plants do not seem to differ sufficiently from ours to merit a distinct specific name. The character upon which *Polypodium Eckloni* Kunze [Linnaea **10**: 498. 1836] was founded do not seem to be constant, the frond being described as having the lowest pinnae longer than the upper ones and the upper surface of the frond devoid of scales ("*supra nudis*"). In our American plants the absence of scales on the upper surface of the frond is very uncommon. A few specimens collected in the United States agree perfectly with the description of *P. Eckloni.* In typical plants there are some differences, but apparently not sufficiently marked to warrant segregation. Perhaps when we have more material at hand and know the plants better, the African plant may prove to be a distinct species.

Specimens collected in Brazil and deposited in U. S. National Museum agree with the description of *Marginaria minima* Bory. In these the fronds are at the most 8 cm. high with the pinnae, except the uppermost, nearly of the same length [6 mm., more or less] and subopposite. There is also a marked difference in the scales, those of *M. minima* being acuminate.

Dr. Lindman [Arkiv för Botanik **1**: 243. 1903] describes two forms of *P. incanum* from Brazil; one "*plantae parvae*" from Rio Grande do Sul, the other "*plantae maximae*" from Matto-Grosso. There is, therefore, some indication that typical plants are found at least at far south as Central Brazil.

Mr. A. Ernst [Jour. Bot. **3**: 323. 1865] reports *P. incanum* growing "*on roofs of houses*" in Caracas, Venezuela. In Costa Rica it grows on coffee-trees [*Tonduz*, 1904]. Mr. W. R. Maxon reports it from Jamaica, as common on rocks and trees

in open or partially shaded situations from the sea-level to about 5,000 feet altitude. Dr. J. K. Small [TORREYA 3: 141. 1903] reports it "from sea-level to almost 4,000 feet altitude on the eastern slopes of the Blue Ridge. * * * It is confined to trees only when rocks are lacking." Mr. C. L. Pollard [Plant World 5: 133. 1902] records a locality discovered by Mr. W. P. Hay, near the Potomac River and within fifteen miles of Washington, D. C.; this is possibly the most northern locality known for this fern. This little colony of plants, from which the figured specimen was taken, grows on a steep rocky slope; it consists of numerous plants matted together and covering many square feet of surface. In this respect it differs from another of the rock-loving ferns, *Cheilanthes lanosa,* which forms small clusters along the fissures of the rocks.

Our specimen is of interest also on account of its forking frond — a rare phenomenon in this species — which, may I state it, holds its own in beauty. *Cheilanthes lanosa* may possibly excel it as an ornament in its native haunts.

WASHINGTON, D. C.

THE ARTIFICIAL INDUCTION OF LEAF FORMATION IN THE OCOTILLO *

BY FRANCIS E. LLOYD

The post-pluvial appearance of foliage within a very short time upon desert plants which remain through periods of drought in a leafless condition is a phenomenon which has very often been remarked. The behavior in this regard is most striking in deserts, where there is prolonged lack of rain. Although in some regions the rain penetrates into the ground very rapidly, nevertheless it has seemed improbable to many, no doubt, that the absorption of this water from the soil alone gives the necessary stimulus to leaf formation. Led by this idea, attempts have been made to find in many of the superficial structures of plants the means for the absorption of water, or water vapor, and it may very well be

* This work was done at the Desert Botanical Laboratory, Tucson, Arizona, under a grant from the Carnegie Institution, of Washington, during the summer of 1905.

that experimental research will in the future throw light upon the extent of adaptation, as evidenced by anatomical structures, to which plants have attained in this matter. It was during a conversation upon such points with Dr. W. A. Cannon at the Desert Botanical Laboratory that the suggestion was made by him that it would be instructive to see if any light could be obtained upon the influence of meteoric water upon the development of leaves in *Fouquieria splendens*, the ocotillo of the southwest. I accordingly planned three experiments which were carried out upon a perfectly leafless plant, all alike in principle, but differing in details. In one case, the only one I shall describe, a reservoir, consisting of a gallon bottle, was attached to the neighboring limbs of a "palo verde," and a siphon arranged to lead water to a string of cheese-cloth, which in turn led the water to a bandage of the same cloth tied about a stem of the ocotillo three feet from the ground. The fierce winds several times played havoc with my arrangements, but finally I managed to adjust the apparatus to the swinging of the stems by allowing slack in the cheese-cloth string. The siphon ended in a capillary tube, so that the flow of water was small and, while it ran down the ocotillo stem at times, it did not reach the ground in any case. The reservoir was replenished daily, but the flow of water was discontinuous. The result was, of course, a closer simulation of the actual occurrences at the time of the rainy season.

The first run of water was applied on the morning of the first of July, and this was repeated each day. The stem was thus kept more or less wet for half the time. On the evening of the fourth, the leaves along 12–15 inches of the stem below the bandage showed marked development, being 1 centimeter long; and by the sixth of July, at three P. M., their length was 1.5 centimeters. On July 9, the largest leaves were 2 centimeters long, and the branch in question, together with its neighbors were photographed (FIG. 1). In looking at this picture one must realize that all the stems shown were at first equally leafless. It will be instructive to compare the above facts with those observed after rain.

On July 11, at 5 P. M., we had the first shower of the rainy

season, the amount of precipitation being one and one-tenth inches within two hours, drenching, of course, all the vegetation. On the following day (the 12th) at four P. M., it was quite evident to the eye that the buds had made a start. By July 13, the slender conical buds along the whole extent of the stems were 7 to 8 millimeters long. On July 14 at five A. M., the rosettes of leaves were well formed; the length of the largest leaves was 1.5 centi-

FIG. 1. *Fouquieria splendens*, showing a branch which had been irrigated during four days.

meters, their size being, however, quite uniform. On July 15, the photograph forming the second figure was taken. It will be noted that the leaves on the irrigated stem were at that time much larger than the freshly formed leaves, that is, those produced after the rain, and as a result of the stimulus thereby given.

It will be noted that the development after the rain was more rapid than after irrigation, notwithstanding that the water was applied artifically from time to time during the period of growth under observation, while the wetting by rain occurred but once. The fact, however, must not be lost sight of, that following the rain there is a marked rise in the relative humidity, though I re-

gret that I did not take observations on this point at the position of the plant. Then, too, the ground got a good soaking, and it is remarkable how rapidly the soil becomes moist for a considerable depth. Undoubtedly this fact was contributory to the rapid growth of the post-pluvial foliage. In the experiment detailed above, the total growth in a few days was due wholly to the water available on the surface of the stem, and the inference is not strained, I believe, if we conclude that, normally, the first stimulus to growth in the leaves is due to the water taken up, probably, at or near the buds. In view of the very thick coating of waxy

FIG. 2. *Fouquieria splendens* — the same as in FIG. 1, three days after a rain.

bark it seems unlikely that the water would find entrance elsewhere, though we may be wrong in this, since there are rifts through which conceivably the water might enter.

It may also be noted that the buds of the ocotillo are minute, sometimes indeed scarcely visible, and covered by, at most, a few light-brown, thin, chaffy scales. The repeated loss of leaves at the same place results in a rough area surrounding the base of the bud at which water may, we may well believe, be taken up. There is otherwise no evidence of the presence of any special adaptive

structures to this end, and their absence in a very marked desert type of plant is not to be overlooked. That the absorption of water by the stem is of no very great importance, if any, in the economy of the ocotillo, may perhaps well be maintained ; while on the other hand we might argue that in regions where the rain is very scarce the very rapid production of foliage would be of so great importance that even the little water absorbed would be equally so. At any rate, the question here barely touched upon is one of a host of similar ones which need elucidation by constant study under just such special conditions as are to be found in the desert.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

AN OLD SWAMP-BOTTOM

BY EDWARD W. BERRY

We all make our pilgrimage to the swamp : the lover of flowers for the pink lady's-slipper, giant rhododendron, fragrant pogonia and Indian tea-kettle (*Sarracenia*) ; the collector for these and for coptis, the sun-dew, and the ferns and sedges that haunt the inaccessible tangles of verdure which no swamp ever lacks. There are swamps and swamps, but all are of unfailing interest, whether the pilgrim be botanist, entomologist, or merely a seeker for cranberries or blueberries. They have equally their vernal and autumnal coloration. In the spring, the violet and marsh-marigold ; in the fall, the closed gentian and bidens.

No swamp is of more interest than a fossil swamp, and it is my purpose to take you on a little journey to one such — not to one of those gigantic examples of buried marshes where in the far-oft Carboniferous age was laid down the world's supply of coal, but to the remains of one of those smaller swamps that flourished during the Cretaceous and was like the many swamps that dot the country at the present time, where the mosquito and hyla flourish and the magnolia blooms.

Going back a few million years, three to five is a reasonable estimate, we come upon a time when deposition was active along

our eastern coast; a time when the clays and sands of the Raritan formation were being laid down and a long-continued series of fresh or lacustrine deposits had culminated by a slow sinking of the land, which presently substituted marine conditions. The series of beds comprising the Cliffwood clays and Magothy sands represents the results of this transition period. In one locality clays were forming while close by sands were being deposited.

All through these beds we have abundant evidence that the adjoining land supported a luxuriant vegetation, and that this land was not far removed from the area of sedimentation; possibly we have to do with a series of islands or inlets, which would well explain the varying character of the deposits and the contained plant remains. This evidence is furnished by the abundance of sulphates and carbonates of iron, the dark color of the clay due to carbonaceous matter, the layers of lignite intercalated with the sand beds, and to thicker layers of lignite which are everywhere present. Some of these lignite beds have all the appearance of having been old swamp-bottoms.

In mining the overlying and underlying clays, immense logs of lignite are uncovered, lying as if overwhelmed by a sudden influx of sediment. I have seen logs of this sort three or four feet in diameter and what was left of them, ten feet or more in length, and if the statements one hears about the pits are to be relied upon, much larger remains are often uncovered.

Such a lignite bed in the pits of the Cliffwood Brick Company has interested me exceedingly. It is situated on Whale Creek about a mile southwest from Raritan Bay, in Monmouth County, New Jersey. The lignite consists of matted vegetation but slightly triturated, showing a mixed mass of partially decayed leaves, bits of sticks and small stems, scales of cones and various fruits and seeds, exactly such things as you would find at the bottom of some woodland pool at the present time. One never tires of the fascination of breaking open these lignite masses, exposing the faint impression, perhaps of a large leaf, or the remains of what was a button-ball in the far-off days, or the thousand and one evanescent promises of what was once definite living matter.

Exposure after such a long entombment soon reduces these lignite masses to fragments. A satisfactory way to study their flora, however, is to bring away large pieces of the lignite and macerate them in water at leisure moments, when they may be easily separated into their component parts and any remains of definite shape can then be more readily seen.

Distributed through the lignite beds are little globules and tear-shaped masses of amber; one hears of large masses being found occasionally, but the largest piece that I have taken out is

FIG. 1. Some of the fruits, seeds, twigs and cone scales washed out of the lignite.

about the size of a lima bean. This amber is the fossil resin of some of the trees of the period, the weight of the evidence pointing to the *Sequoia*, as little leafy twigs of two or three species are found all through the lignite, while cones occur elsewhere in the neighboring clays.

A clay pit is a most desolate looking place all the year round. Under a scorching July sun, with the thermometer standing at over 100° and no shade, one has a perfect imitation of an oven, and the imagination almost fails to picture the verdure of this identical spot in the ancient days. Here flourished tall sequoias and plane-trees, close by grew ancient spruces and cycads and semi-tropical ferns. In the spring, the magnolia and sheep-berry bloomed. In the fall, the figs ripened, and the autumnal tints of the oak and maple vied with the vernal coloration.

Besides the larger pieces of stems and fragments of leaves as well as an abundance of needles of *Sequoia* and *Cunninghamites*,

I have found the following: Twigs of *Juniperus hypnoides* Heer and *Sequoia Reichenbachi* (Gein.) Heer; aments of probably a *Sequoia;* eight or ten varieties of seeds; several varieties of fruits, including *Myrica* and *Platanus;* leaves of *Brachyphyllum;* five or six varieties of cone scales, including *Dammara* and *Picea;* and a miscellaneous assortment of undeterminable remains.

MARYLAND GEOLOGICAL SURVEY,
BALTIMORE, MD.

MESADENIA LANCEOLATA AND ITS ALLIES

BY ROLAND M. HARPER

In the genus *Mesadenia* Raf. (*Cacalia* L. in part) there is a small group of species growing in moist places in the coastal plain of the southeastern United States and flowering in late summer, characterized by terete stems, leaves with parallel or subpinnate primary veins, and involucral bracts not keeled. These plants are distinguished from each other by comparatively slight morphological characters, but differ more in range and habitat.

The first published species of this group is *M. lanceolata*, described by Nuttall in 1818 from specimens collected in Georgia and Florida (presumably in the maritime counties) by Dr. Baldwin. Its leaf-blades are glaucous, especially beneath, and lanceolate to oblanceolate in outline.

In 1822 Elliott described a plant collected by himself on his trip to the Alabama territory, identifying it with *Cacalia ovata* Walt. According to Elliott's description, and specimens which have since been collected in the same general region, this plant differs from Nuttall's *Cacalia lanceolata* chiefly in having leaf-blades nearly as broad as long; but its range and habitat are so different that there is little danger of confusing the two species in the field.

But the identity of Elliott's *Cacalia ovata* with Walter's is by no means certain, since the former is not now known east of the Ocmulgee River, while the latter presumably came from South Carolina. There are also some serious discrepancies between Elliott's description and that of Walter, as was noted by Torrey

and Gray, who retained the name *ovata* for the plant described by Elliott, and referred Walter's description doubtfully to *Cacalia tuberosa* Nutt., a species chiefly confined to the Mississippi valley, as far as we know at present. In 1892, MacMillan (Met. Minn. 555) went a step further and formally substituted Walter's specific name for Nuttall's *tuberosa*, transferring it at the same time to *Senecio*, in which the original species (*atriplicifolia*) was placed by Hooker.

But *C. tuberosa* is not known to range farther east than Alabama, so it is highly improbable that Walter ever saw it. His description is rather unsatisfactory, as usual, but what there is of it will apply much better to *Cacalia sulcata* Fernald,* a recently described species allied to *C. tuberosa*. This, too, has a restricted range, being known as yet only from Southwest Georgia and West Florida, but the chances of its being found hereafter in the vicinity of Walter's home are doubtless greater than in the case of the two comparatively well-known plants just discussed.

From the foregoing it is pretty evident that the plant described by Elliott is now without a name, so I have provided one for it below.

A third member of the *lanceolata* group is common in moist pine-barrens in some of the "wire-grass" counties of Georgia (see TORREYA, **5**: 114, second line from bottom). It differs from *M. lanceolata* in having shorter leaves, which are not at all glaucous but yellowish-green throughout, and being scarcely more than half as tall. Its range seems to be entirely distinct, for I have seen it only in the Altamaha Grit region, and *M. lanceolata* only in the flat country south and east of there. A plant described by Elliott from specimens sent from Louisville, Georgia, by James Jackson, and doubtfully referred to *Cacalia lanceolata*, was probably the same as mine from the Altamaha Grit region. Louisville is not in this region, but Mr. Jackson may have collected the *Mesadenia* some distance south of Louisville, as he is believed to have done in the analogous case of

* Bot. Gaz. **33**: 157. 1902. See also Bull. Torrey Club **30**: 342. 1903; **31**: 27. 1904. *Mesadenia dentata* Raf. (New Fl. N. A. **4**: 79. 1836), described from Alabama, is possibly synonymous with this.

Pentstemon dissectus Ell.* Elliott describes the leaves as "slightly glaucous underneath," but they appear more so in the dried state than when living. For the present it seems best to treat this bright-green plant as a variety rather than a species, since its chief character is scarcely distinguishable in herbarium specimens.

The nomenclature and known distribution of these three plants may be summarized as follows:

Mesadenia Elliottii

"*Cacalia ovata* Walt."; Ell. Bot. S. C. & Ga. **2**: 310. 1822. T. & G. Fl. N. A. **2**: 435. 1843; Chapm. Fl. S. U. S. 244. 1860; Wood, Class-Book, 463. 1861; Gray. Syn. Fl. **1**^{2}: 395. 1884.

"*Mesadenia ovata* (Walt.) Raf." Small, Fl. S. E. U. S. 1301. 1903.

Grows mostly in damp woods, ranging from Georgia and Florida to Louisiana in the coastal plain. Elliott said of it: "Grows in the western parts of Georgia.† Common in the highlands near the Alabama." Wood reported its having been collected in the vicinity of Macon, Ga., by Dr. Mettauer. Dr. Mohr reported it from Lee and Montgomery counties in the Cretaceous region of Alabama, which is probably just about where Elliott saw it. In Georgia I have seen it in the counties of Houston, Early and Berrien (*no. 1701*), and only in places where the Lafayette formation seems to be absent. I have examined the following specimens besides my own:

GEORGIA: Without further data, *Boykin*. "Clearing in edge of swamp near Smithville," Aug. 26, 1901, *A. H. Curtiss* (*no. 6884*).

FLORIDA: Middle Florida, *Chapman* (*no. 325*).

ALABAMA: Vicinity of Auburn, Lee Co., several collections by *Earle* and others, without indication of habitat.

MISSISSIPPI: Mendenhall, Simpson Co., Aug. 18, 1903 (without further data), *S. M. Tracy* (*no. 8671*).

* See Bull. Torrey Club **32**: 166, 167. 1905.

† Presumably near the fall-line, and probably not far from Columbus. See Bull. Torrey Club, **31**: 12. 1904.

Louisiana: Without further data, *Leavenworth.* "Damp valleys in pine woods, Feliciana. August," *Wm. Carpenter.*

Mesadenia lanceolata (Nutt.) Greene,* Pittonia **3**: 182. 1897. *Cacalia lanceolata* Nutt. Gen. **2**: 138. 1818.

In Georgia I have seen this in flat damp pine-barrens in McIntosh (especially around Darien Junction), Glynn, and Brooks (*no. 1631*) counties. In Alabama Dr. Mohr reported it from Mobile and Baldwin counties, in various situations varying from moist pine-barrens to brackish marshes. (Dr. Chapman gave brackish marshes as its only habitat.) Specimens examined show it to range southward to the Everglades of Florida and westward to Louisiana.

Mesadenia lanceolata virescens var. nov.

Stem 9–10 dm. tall; leaves yellowish-green on both surfaces, not glaucous, the lowest 16–18 cm. long. Otherwise much like *M. lanceolata.*

Apparently confined to the Altamaha Grit region of Georgia, where it grows in moist pine-barrens, with both Lafayette and Columbia formations present. Flowers in September and October. It is represented in my collections by *no. 664*, collected September 19, 1900,† and *no. 1678*, collected September 26, 1902, both from Tifton, Berrien county. I will designate *no. 1678* as the type because I have distributed more specimens of it than of the earlier number, but the two collections are absolutely identical, their stations being only a few feet apart.

I have noted the same plant also in the counties of Dodge, Telfair, Appling, Coffee, Wilcox, Irwin, Dooly, Worth, Colquitt and Thomas; and I have little doubt that it grows also in Bulloch, Emanuel, Tattnall and Montgomery, which counties I have not yet visited at the proper season for identifying it. Jackson's plant mentioned by Elliott, if it is the same as mine, probably came from Emanuel County.

College Point, N. Y.

* The authorship of this combination is usually credited to Rafinesque, but he gave neither description nor synonyms.

† See Bull. Torrey Club, **28**: 459 (first paragraph). 1900.

NEWS ITEMS

Professor John M. Coulter, of the University of Chicago, sailed for Europe on October 7, expecting to remain abroad until next April.

Mr. George V. Nash, of the New York Botanical Garden, lectured October 21 at the Field Columbian Museum, Chicago, on "Hayti, the Negro Republic."

Mr. Louis Harman Peet, author of "Trees and Shrubs of Prospect Park," and "Trees and Shrubs of Central Park," died suddenly at his home in Brooklyn on October 18.

"A Nature Study of Maryland Plants," is the title of an attractively illustrated and popularly written pamphlet by Frederick H. Blodgett, which has recently appeared as vol. 2, no. 1 of the Maryland Agricultural College Bulletin.

The program of the autumn lectures of the New York Botanical Garden, to be delivered in the lecture hall of the Museum Building, Bronx Park, on Saturday afternoons, at 4:30 o'clock, is as follows: October 7, "Autumn Features of Native Trees and Shrubs," by Dr. N. L. Britton; October 14, "Botanical Explorations in Hayti," by Mr. Geo. V. Nash; October 21, "The Faculties of Plants," by Dr. D. T. MacDougal; October 28, "A Summer in the Desert," by Professor Francis E. Lloyd; November 4, "The Sea-Gardens of Tropical America," by Dr. M. A. Howe; November 11, "Farming and Fruit-Growing in Cuba," by Dr. W. A. Murrill; November 18, "Fossil Plants," by Arthur Hollick; November 25, "Tropical Fruits," by Professor H. H. Rusby.

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THE PLANT FORMATIONS OF THE ADIRONDACK MOUNTAINS

By John W. Harshberger

Geologically and physiographically, the life-history of the Adirondack Mountains has been long and complex. Commencing at some period of Archean time, long before the beginning of the known geologic record, they have maintained a land condition almost, if not quite, down to the present time. Since the earliest time many thousands of feet of strata have been removed, until now the various elevations stand revealed to us in a planed-down character. We now find them to be mountains of considerable elevation, somewhat rugged in outline, but much less rugged than the Andes, Alps, or Rocky Mountains. There are few lofty, inaccessible cliffs, but instead, rounded, easily scaled hills and mountain peaks, reaching only very rarely to a height greater than one mile above sea-level. This rounded form has been emphasized by the scouring action of the ice of the glacial period, which covered the highest peaks of these mountains. Mt. Tahawus (Mt. Marcy) is the highest peak (5,344 feet) and Mt. McIntyre comes next (5,112 feet).

The plant formations have been developed in the period of time since the retreat of the glacial ice-sheet. One can clearly trace the sequence of development, not only in the conversion of lakes into bogs and bogs into mountain meadows, but also in the forest formations and associations themselves. The following brief account presents the result of a study of these formations made in the summer of 1904, when the author had the pleasure of botanizing with Dr. Oscar Drude, professor of botany in the Dresden Technical High School and director of the Royal Botanic Garden, Dresden. The elevations were determined by

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Professor Drude, who brought an aneroid barometer with him to America.

Deciduous Forest Formation.— The forest at the base of Mt. Tahawus along the Au Sable River and about the Au Sable lakes, according to my observations, consists of the following dominant species: * *Betula lutea*, *Fagus americana*, *Acer saccharum*, *Tsuga canadensis*, *Thuja occidentalis*, *Pinus Strobus*, *Abies balsamea* and *Betula papyrifera* (the *Fagus-Acer-Betula* facies), while as secondary trees grow *Acer rubrum*, *Acer pennsylvanicum*, *Populus tremuloides*, *Sorbus americana* and beneath the latter *Viburnum alnifolium*, *Rubus odoratus* and *Viburnum cassinoides*. Such are called in Adirondack phraseology, hardwood lands, which occupy in general the elevated flats and slopes where the deciduous-leaved trees are the characteristic species. *Acer saccharum*, *Betula lutea* and *Fagus americana* attain their best development on these lands, while *Tsuga canadensis* is of inferior quality to that found on the moister soil of lower ground.† Along the Au Sable River, near its source, in a deep gorge were found in association *Acer saccharum*, *Tsuga canadensis* and *Betula lutea* as the dominant species, while the beech, *Fagus americana*, seems to have a crown which never rises quite above that of the trees mentioned (*Tsuga-Fagus* facies). The herbaceous plants of the forest floor are *Viola rotundifolia*, *Tiarella cordifolia*, *Medeola virginica*, *Mitchella repens*, *Unifolium canadense*, *Clintonia borealis*, *Trillium undulatum*, *Streptopus amplexifolius*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Aralia racemosa*, *Dalibarda repens* and *Lycopodium lucidulum*. *Taxus canadensis* forms a secondary element in the *Tsuga-Fagus* facies. *Polypodium vulgare* forms mats in undisputed possession of the tops of boulders, while the rock sides are distinguished by the presence of species of *Umbilicaria*. *Dryopteris noveboracensis* forms extensive patches in the deep recesses of the forest.

The shores of lower Au Sable Lake, which are mountainous and steep, are covered with *Betula papyrifera* associated with *Abies balsamea* and *Populus tremuloides*, while near the upper end

* Names according to Britton's Manual, 1901.

† Pinchot, G. The Adirondack Spruce, 12. 1898.

of this lake grow *Sorbus americana*, *Picea Mariana* and *Acer saccharum*, and *Thuja occidentalis* becomes more abundant and virtually supplants the paper birch, *Betula papyrifera*. The vegetation of the forest floor here consists of *Clintonia borealis*, *Oxalis Acetosella*, *Osmunda Claytoniana* (= *O. interrupta*), *O. cinnamomea*, *Chiogenes hispidula*, *Unifolium canadense* and *Veratrum viride*.

The forest about Raquette Lake is a mixed one of broad-leaved and coniferous trees, the latter predominating. Such are the spruce flats of the lumbermen, where the soil is fresh and deep, with *Picea Mariana* (= *P. rubens* Sargent), of medium height and diameter. These flats form the lower limit of *Acer saccharum*, which is common on higher ground. *Abies balsamea* is small. The principal species, in the order in which they occur, are: *Picea Mariana* (= *P. rubens* Sargent), *Betula lutea*, *Abies balsamea*, *Tsuga canadensis*, *Fagus americana*, *Acer saccharum* and *Pinus Strobus* (*Picea-Betula* facies). With these are associated *Thuja occidentalis*, *Picea Mariana*, *Larix americana*, *Pinus resinosa*, *Acer saccharinum* (= *A. dasycarpus*) and *Betula populifolia*, with scattered *Fraxinus americana* and *Prunus serotina*. *Populus tremuloides* and *Prunus pennsylvanica* are found on the burned-over land with an undergrowth in the primeval forest of *Viburnum alnifolium*, *Acer pennsylvanicum* and *Acer spicatum*. Here, the characteristic swamp species are *Picea Mariana* (red spruce = *P. rubens* Sargent), *Abies balsamea*, *Picea Mariana* (black spruce), *Pinus Strobus*, *Larix americana*, while on the gravelly knolls in the swamps occur *Pinus Strobus*, *Tsuga canadensis*, *Picea Mariana* (= *P. rubens* Sargent), *Abies balsamea*, etc. *Thuja occidentalis* and *Larix americana* grow on the poorest drained land.*

The forest about Tupper Lake is characterized by *Picea Mariana* (= *P. rubens* Sargent), *Acer saccharum*, *Fagus americana*, and *Betula lutea*. The sugar maple, *Acer saccharum*, and beech, *Fagus americana*, have the advantage over *Betula lutea* on the

* Hosmer, R. S., and Bruce, E. S. A Forest working Plan for Township 40. Bulletin 30, Division of Forestry, U. S. Department Agriculture. 1901.

Graves, H. S. Practical Forestry in the Adirondacks, Bulletin 26, Division of Forestry. 1899.

better soils, because the latter is less tolerant of shade. The following list shows the relative degree of tolerance beginning with those that require the most light: *Larix americana*, *Populus tremuloides*, *Prunus pennsylvanica*, *Pinus Strobus*, *Betula lutea*, *Acer rubrum*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent), *Tsuga canadensis*, *Fagus americana* and *Acer saccharum*, while the best soils support *Fagus americana*. *Acer saccharum* and species in general may be arranged according to edaphic requirements, beginning with the most requiring: *Prunus serotina*, *Acer saccharum*, *Fagus americana*, *Acer rubrum*, *Pinus Strobus*, *Abies balsamea* and *Picea Mariana* (= *P. rubens* Sargent).

As one ascends, the facies in some places consists of the deciduous species mentioned with such ferns and herbs on the ground as *Adiantum pedatum*, *Polystichum acrostichoides*, *Monotropa uniflora*, *Chiogenes hispidula*, *Clintonia borealis*, *Cornus canadensis* and *Panicularia elongata*. At 3,600 feet, especially on the southern flanks of Mt. Tahawus, the forest formation consists of *Picea Mariana* (red spruce = *P. rubens* Sargent), *Betula lenta*, *Betula lutea*, *Sorbus americana*, *Abies balsamea* and *Thuja occidentalis*; and *Veratrum viride* occurs on the forest floor with *Vaccinium canadense*, *Lycopodium annotinum*, *L. lucidulum*, *Aster acuminatus*, *Solidago flexicaulis*, *Coptis trifolia*, *Linnaea americana* and *Streptopus amplexifolius*. *Solidago flexicaulis* may be the lowland representative of the alpine *Solidago alpestris*.

CONIFEROUS FORMATION.— These southern slopes are the spruce slopes, according to the designation of the lumbermen, because *Picea Mariana* (= *P. rubens* Sargent) is dominant. The absence of *Acer saccharum*, *Acer rubrum* and *Viburnum alnifolium* is due to elevation and is noteworthy. *Abies balsamea* on an elevated saddle of the mountain forms a pure forest with shrubby and herbaceous companions (*Abies* facies), and in open swampy places surrounded by the balsam occur *Osmunda cinnamomea* and *Veratrum viride*.

The "Krumm-holz," or dwarf timber, is reached at 5,000 feet (1,530 m.) on Mt. Tahawus (Mt. Marcy). Here *Abies balsamea* is about five feet high, with its base covered by *Hypnum splendens*, *H. Crista-castrensis* and *Dicranum* sp., with *Linnaea americana*,

Chiogenes hispidula and *Cornus canadensis* beneath, while *Vaccinium canadense* and *Sorbus americana* are prominent shrubs. At 1,550 meters trees are only 1–2 feet high, and disappear entirely, being replaced in exposed places by *Ledum groenlandicum*, *Vaccinium uliginosum* and *V. caespitosum* (*Vaccinium-Ledum* association), *Empetrum nigrum* (*Empetrum* association), *Alnus alnobetula* (*Alnus* association), and in sheltered places are found *Spiraea salicifolia*, *Gentiana linearis*, *Veratrum viride* and *Linnaea americana*.

ALPINE PLANT FORMATION. — The plants on the bare top (5,300 feet), collected by the writer,* are *Coptis trifolia*, *Viola blanda*, *Arenaria groenlandica*, *Oxalis Acetosella*, *Sibbaldiopsis tridentata*, *Rubus strigosus*, *Sorbus americana*, *Spiraea salicifolia*, *Ribes prostratum*, *Cornus canadensis*, *Linnaea americana*, *Houstonia caerulea*, *Solidago alpestris*, *Nabalus Bootii*, *Vaccinium caespitosum*, *V. pennsylvanicum*, *V. pennsylvanicum angustifolium*, *V. uliginosum*, *Oxycoccus Oxycoccus*, *Chiogenes hispidula*, *Chamaedaphne calyculata* (*Cassandra calyculata*), *Ledum groenlandicum*, *Kalmia glauca*, *Rhododendron lapponicum*, *Rhinanthus Crista-Galli*, *Trientalis americana*, *Diapensia lapponica*, *Gentiana linearis*, *Empetrum nigrum*, *Betula glandulosa*, *Alnus alnobetula*, *Salix Uva-Ursi*, *Abies balsamea*, *Veratrum viride*, *Eriophorum vaginatum* and *Lycopodium Selago*. A singular lichen, *Thamnolia vermicularis*, attracts the attention by its pure white color, and its cylindric, hollow sharp-pointed podetia 2–4 inches long, growing among mosses and on the thin soil of the mountain-top under sterile conditions. It is more plentiful, according to Professor Peck, on Mt. McIntyre than on Mt. Tahawus (Mt. Marcy). *Lonicera coerulea* ascends almost to the top of the mountain. It occurs behind the sheltering rocks but a short distance south of the signal station. *Carex Bigelovii* is the only sedge on the highest part of the mountain.†

BOG FORMATION.—Two small marshy areas form a part of the open summit of Mount Tahawus. One is a decided depression

* The ascent was made by Professor Drude and the writer on August 26, 1904.

† Peck, C. H. Plants of the Summit of Mt. Marcy. Bulletin New York State Museum 5: 657. 1899.

in the northeast slope; the other is on the eastern slope and is much nearer the top of the mountain. Here were found by me, *Kalmia glauca*, *Ledum groenlandicum*, *Oxycoccus Oxycoccus*, *Eriophorum vaginatum*, *Veratrum viride*, *Vaccinium uliginosum* and several species of *Carex*.

Giant Mountain (4,622 feet) is not bare at the summit, except where shelving rocks occur. Here were found by me *Ledum groenlandicum*, *Arenaria groenlandica*, *Marchantia polymorpha* (in burned areas), *Agrostis rubra*, *Vaccinium pennsylvanicum*, *Linnaea americana* and *Cornus canadensis*. The summits of lower mountains, Mt. Hopkins (3,136 feet) for example, are not above timber-line, but frequently they are bare owing to rock exposures. On this mountain, a smooth rock surface is found, in the broken parts of which grow *Sibbaldiopsis tridentata* (*Sibbaldiopsis* association), while *Vaccinum uliginosum* (*V. uliginosum* association), *Alnus alnobetula* (*Alnus* association), *Vaccinium pennsylvanicum*, *V. pennsylvanicum angustifolium* and *V. canadense* are found along the edge of the forest, which consists at this elevation of *Picea Mariana*, *Betula papyrifera*, *B. lenta*, *Prunus pennsylvanica*, *Acer pennsylvanicum*, *Pinus Strobus*, *Populus tremuloides*, *Thuja occidentalis* and *Abies balsamea*, that reach to the top of the mountain.

Hemlock Formation. — The hemlock, *Tsuga canadensis*, forms a pure forest upon the ridges at the foot of Giant Mountain. Here the beech, *Fagus americana*, *Acer rubrum* and *Acer pennsylvanicum* are subordinate species with a few spruce trees (*Picea*) intermixed. The herbaceous undergrowth is typical of such forests, consisting of *Linnaea americana* (in mats), *Mitchella repens*, *Cornus canadensis*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Clintonia borealis*, *Peramium repens* (*Goodyera repens*), *Medeola virginica*, *Pyrola secunda*, *Viola rotundifolia*, *Chimaphila umbellata*, *Gaultheria procumbens*, *Coptis trifolia*, *Unifolium canadense*, *Cypripedium acaule*, *Lysias orbiculata* (*Habenaria orbiculata*) and *Lycopodium lucidulum*. This is the same association of species that one finds in southeastern Pennsylvania under the hemlocks, with the addition in the Adirondacks of *Linnaea americana*, *Clintonia borealis* and *Coptis trifolia*.

In more elevated situations, on Giant Mountain, one finds the forest to consist of *Picea* sp. and *Abies balsamea*, together with *Betula papyrifera*, *Acer rubrum*, *Betula lenta* and *B. lutea*, with a fern, *Dennstaedtia punctilobula* (= *Dicksonia pilosiuscula*), abundant, together with *Ribes prostratum* and *Rubus strigosus* (*Picea* facies).

Pinus resinosa, in a few localities, as on the southeastern slopes of Baxter Mountain (2,400 feet), makes a formation (*Pinus resinosa* formation). Sometimes *Pinus Strobus* is intermingled with *Juniperus communis alpina* together with *Vaccinium pennsylvanicum*, *V. canadense* and *Pteridium aquilinum* on the rocks (*Juniperus-Vaccinium* association). Near these rocks grow *Populus tremuloides*, *Amelanchier oligocarpa*, *Betula papyrifera*, *Spiraea salicifolia* and *Diervilla trifida*. The two pines dominate the southwest slopes of Baxter Mountain down to the lowest ridges, where *Quercus rubra*, *Acer pennsylvanicum*, *Tsuga canadensis* are in association, finally changing below to *Tsuga canadensis*, *Fagus americana*, *Abies balsamea* and *Acer saccharum*.

The ponds, or small lakes of the Keene Valley neighborhood, are fringed by *Chamaedaphne calyculata*, *Cornus alternifolia*, *Thuja occidentalis*, *Betula papyrifera*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent) and *Pinus Strobus*, together with *Galium asprellum* and *Impatiens biflora*, while in the shallow water occur *Nymphaea advena* (*Nuphar advena*), *Lobelia Dortmanna*, *Eriocaulon* sp. and *Sparganium simplex* (lake-plant formation). The ferns of the forest, near such ponds, are *Polypodium vulgare* (on boulders), *Adiantum pedatum*, *Botrychium virginianum* and *Polystichum acrostichoides*.

Rock-Gorge Formation.—This is typically developed in the Au Sable Chasm in the northern part of the Adirondack area. The Au Sable River has cut a narrow gorge, or occupied a fault, with almost straight sides and a few overhanging shelves of rock. Along the crest of the precipices and in the gorge, according to my observations, are found *Pinus resinosa*, *Betula papyrifera*, *Tsuga canadensis*, *Thuja occidentalis*, *Betula lutea* and *Acer rubrum*, while somewhat back from the gorge together with the above-mentioned trees are *Pinus Strobus*, *Betula populifolia*,

Quercus rubra, *Q. alba* and *Q. nigra*, beneath which occur *Amelanchier canadensis*, *Hamamelis virginica* and *Gaylusaccia resinosa.* The rock crevices show *Campanula rotundifolia Langsdorfiana*, *Polypodium vulgare*, *Aralia racemosa*, *Rubus odoratus* and *Ribes rotundifolium*, and, on the ledges, clumps of *Rubus strigosus*.

University of Pennsylvania.

A KEY TO THE BROWN SESSILE POLYPOREAE OF TEMPERATE NORTH AMERICA

By William A. Murrill

The pileate species of Polyporaceae have been recently grouped under three subfamilies; the Polyporeae, with porose hymenium and annual hymenophore, the Fomiteae, with porose hymenium and perennial hymenophore and the Agariceae, with furrowed hymenium. The plants treated in the present key are Polyporeae with brown context and without a distinct stipe.

Key to the Genera.

- Hymenophore sessile.
  - Spores hyaline.
    - Context light-brown.
      - Context at first fleshy, becoming slightly corky. **A.** Ischnoderma.
      - Context tough from the first.
        - Surface encrusted. **B.** Antrodia.
        - Surface not encrusted.
          - Surface glabrous or nearly so.
            - Hymenium alveolate. **C.** Favolus.
            - Hymenium normally poroid. **D.** Hapalopilus.
          - Surface distinctly hairy. **E.** Funalia.
    - Context dark-brown.
      - Context friable. **F.** Phaeolus.
      - Context tough.
        - Tubes entire, pileus heavily bearded. **G.** Pogonomyces.
        - Tubes soon splitting into teeth, pileus velvety. **H.** Cerrenella.
  - Spores brown. **I.** Inonotus.

A. The Species of Ischnoderma.

Plant large, brown, resinous. *I. fuliginosum* (Scop.) Murr.

B. The Species of Antrodia.

Plant small, brown, zonate, encrusted. *A. mollis* (Sommerf.) Karst.

C. The brown Species of Favolus.

Plant thin, smooth, purplish-zonate. *F. variegatus* (Berk.) Murr.

D. The Species of Hapalopilus.

1. Hymenium concolorous; pileus smooth, azonate; context soft and friable. *H. rutilans* (Pers.) Murr.
   Hymenium differently colored; pileus rarely smooth; context rigid or corky, not friable. 2.
2. Hymenium lilac-colored, tubes 1 cm. or more in length; pileus concentrically sulcate. *H. sublilacinus* (Ell. & Ev.) Murr.
   Hymenium dark-brown, tubes shorter. 3.
3. Context rigid; pileus azonate or with few and indefinite markings. *H. gilvus* (Schw.) Murr.
   Context flexible; pileus plainly and definitely multizonate. *H. licnoides* (Mont.) Murr.

E. The Species of Funalia.

Plant thick and firm; a northern species. *Funalia stuppea* (Berk.) Murr.
Plant thin, soft and flexible; found in Louisiana and Florida. *Funalia villosa* (Sw.) Murr.

F. The Species of Phaeolus.

A large brown spongy plant, usually stipitate, but with puzzling sessile forms. *P. sistotremoides* (Alb. & Schw.) Murr.

G. The Species of Pogonomyces.

A plant easily known by its dense covering of rigid hairs and minute firm pores. *P. hydnoides* (Sw.) Murr.

H. The Species of Cerrenella.

Hymenium concolorous, teeth bright-brown in color. *C. tabacina* (B. & C.) Murr.
Hymenium of a different color from the pileus, teeth covered with a greenish bloom. *C. coriacea* (B. & Rav.) Murr.

I. The Species of Inonotus.

1. Spores deep-brown in color. 2.
   Spores faintly tinted with brown. 3.
2. Surface hirsute, tubes luteous. *I. hirsutus* (Scop.) Murr.
   Surface conspicuously tomentose, tubes not luteous. *I. perplexus* (Peck) Murr.
   Surface glabrous or finely tomentose. *I. dryophilus* (Berk.) Murr.
3. Plants soft, anoderm; found on living shrubs. *I. amplectens* Murr.
   Plants hard, becoming encrusted; found on dead wood. *I. radiatus* (Sowerby) Karst.

New York Botanical Garden.

ON THE OCCURRENCE OF DAUCUS CAROTA IN HAITI

By Norman Taylor

During a recent trip to Haïti, a rather remarkable example of the adaptability of our common wild carrot to tropical conditions was noticed at Marmelade, a small town about fifty miles from the north coast. At an approximate elevation of 2,000 feet I found a field very fairly covered with this weed. It was not a case of its recent introduction in corn or hay, as the town is much too far from the sea, and the natives much too poor to import seeds or forage from other countries.

In colonial times, however, a great deal of Indian corn and seeds of all kinds were taken to the island, and it is only in this way that we can plausibly account for the substantial colonization of the plant. It must have maintained itself for a hundred years or more, and I later had evidences of its migratory tendencies. Along a tiny stream which runs very close to the road from Marmelade to San Michel, an occasional plant was noticeable for ten or fifteen miles, until we came out to a xerophytic plain, where all traces of it were lost. It would be interesting, at some future time, to go over this area again and ascertain how far it had spread.

This is not the first time this troublesome weed has been reported from the West Indies, as I find in the herbarium of the New York Botanical Garden a specimen collected at Guadeloupe; Père Duss' *no. 4015*.

With the somewhat unusual occurrence of this *Daucus* in mind I began looking for other northern species, which from previous reports * might be expected in Haïti, and I was not disappointed. In Marmelade, among what passes for the paving stones of a Haïtian street I found a single plant of *Taraxacum Taraxacum* (L.) Karst. Whether, from the sterility of its environment, the great heat of the sun, or from a combination of these causes, I do not know, but the plant was much stunted,

* Wilson, P. Some introduced Plants in Cuba. Torreya **4**: 188. 1904.

the scape very short, and the head twisted and otherwise deformed.

I found, also, a normal plant of *Plantago major* L. at Plaisance, at an elevation of about 2,200 feet.

A close watch of the country adjacent to the sea-coast failed to bring to light any of these species, and it would seem that it is only in the comparatively cool air of the mountains that they were able to survive.

New York Botanical Garden.

SHORTER NOTES

Tomophagus for Dendrophagus. — My attention has been kindly called by Mr. C. V. Piper to the fact that the generic name *Dendrophagus*, recently used for a new genus of the Polyporaceae (Bull. Torrey Club, **32**: 473. 1905), was assigned by Toumey in 1900 to a slime-mould causing the disease known as "crown-gall" (Bull. Univ. Ariz. Agric. Exper. Sta. **33**: 7–64. *f. 1–31.* 1900). I therefore substitute the name **Tomophagus** for the one preëmpted, with **Tomophagus colossus** (Fr.) as the type.

William A. Murrill.

New York Botanical Garden.

The Gray Polypody in Ohio. — In the October number of Torreya, in the article "Notes on the Gray Polypody," the author, Ivar Tidestrom, states (p. 175) that "*This is possibly the most northern locality for this fern*" — referring to the station noted by C. L. Pollard, at which place, "near the Potomac River and within fifteen miles of Washington," the plant was found by W. P. Hay.

I have a station for the plant which I take to be a little farther north than that mentioned above. At any rate it may be of sufficient interest to report that this fern was collected in 1900 in the northern part of Adams County (Ohio) at a place called Beaver Pond. I also found plants at the village of Mineral Springs, a short distance from the former locality. In the Ohio State Herbarium we have a specimen collected at Batavia Junction, Hamilton County, by Dr. Byrnes, and one collected at Plainville, close to the preceding station, by Mr. Langden.

W. A. Kellerman.

A LACINIATE RUBUS.— Dr. Greene's suggestive paper on *Rhus bipinnata* leads me to recall an instance within my own knowledge, which may throw light on the origin of a cultivated plant. Many years ago I found in a hedge of *Rubus rusticanus*, in Kent, England, a single plant which bore laciniate leaves, but did not seem to differ otherwise from true *rusticanus*. In *Science Gossip*, August, 1889, I gave some account of it, and proposed to call it *R. rusticanus* var. *incisus*. Later I sent a specimen to Kew, and it was identified as *R. laciniatus* Willd., a well-known garden plant of uncertain origin. It appears to me nearly certain that the plant of *incisus* originated where I found it, from *rusticanus* ancestry; but it can hardly be doubted that *R. laciniatus* itself had a like history, at some time and place now wholly forgotten.

T. D. A. COCKERELL.

BOULDER, COLORADO.

DUPLEX NAMES. — In my work over a Patagonian flora I have been compelled to face the problem of giving twin names to species whose original specific names have been raised to generic standing. Provisionally and under protest, I have accepted such names, and even added to the list. But I have never been satisfied with the system which they represent; and I am satisfied that Turczaninow would not have erected the new genus *Ugni* for Molina's old species *Myrtus Ugni*, if he had forseen as its outcome the ultimate name *Ugni Ugni* (Mol.) Macl., a system that duplicates priorities for the old specific name and extinguishes the priority of the other part of the first name.

As the question was re-opened at the recent International Botanical Congress in Vienna, I venture to submit, not for immediate acceptance, but for consideration, and for acceptance, if approved, the following rule — Whenever a specific name of a plant has been promoted so as to become its generic name, then the previous generic name shall be demoted so as to become the new specific name; the original authority to be parenthesized. Thus the species which I have reluctantly called *Ugni Ugni* (Mol.) should become **Ugni Myrtus** (Mol.), the priority of both the primitive names being in this case preserved. This rule would give **Fagopyrum Polygonum** (L.), **Sassafras Laurus** (L.), etc.

I cannot forecast how the proposal will strike experienced botanists ; but it appears to me to be at least worthy of their consideration.

GEORGE MACLOSKIE.

PRINCETON UNIVERSITY,
October 10, 1905.

REVIEWS

Campbell's Mosses and Ferns*

The second edition of Professor Campbell's work on the mosses and ferns will, we are sure, be welcomed by botanists, since the earlier book has been for some time out of print. The value of this book has by no means been small, and its extension to over a hundred pages beyond the limits of the original production, together with the changes made necessary by recent advances in our knowledge, will make it still more useful. Typographically, the new edition is not up to the standard of the first. Cuts which appeared clean-cut before are now blurred, a result no doubt partly due to the damage done to the blocks during storage, and partly to inferior printing.

Among the more noticeable changes in the descriptive part of the work we note that the author adopts the view that the Anthocerotes are coördinate in rank with the Hepaticae and Musci, and that the treatment of this interesting segregate is fuller. The practical limitations of book-making have prevented excursions into detail which, however desirable, would easily have doubled the volume in size. Nevertheless, the author has deemed it well to deal somewhat fully with the maturer phases of the sporophytic generation in the more highly organized groups with which he deals, so far as the scope of his task would permit. We are of the opinion that in many instances he has been led into retailing very well-known or easily attainable information, accessible in many reference books. To this slight extent the descriptions smack of compilation without sufficient critical knowledge of the more obvious points of structure,

*Campbell, D. H. The Structure and Development of the Mosses and Ferns (Archegoniatae). 8vo. 1–657. *f. 1–322.* New York, The Macmillan Company. 1905. Price, $4.50.

points which, though readily observable, cannot be said to be the less important. The reviewer may speak only of those matters of which he claims to have some personal knowledge and would cite the instance on pages 493–4 where *Lycopodium volubile* is said to have but four rows of leaves in common with *L. complanatum.* This is an error, but one which is made also in the "Pflanzenfamilien" of Engler and Prantl. So also the statement that in some species the leaves are of two kinds, that is, dimorphous. As a matter of fact, the leaves on the foliage shoots of *L. alpinum* are of three kinds, those on the dorsal and ventral surfaces being markedly different from each other and also from the lateral ones. Those among us who chiefly disregard matters lying without the range of microscopic vision would complain rather loudly were similar misapprehension of the structure and variety of, say, archegonia, to obtain, but it is difficult for some minds at least to see that error attaching to the observation of, humanly speaking, large things is any less to be shunned.

There are welcome additions to the older book in the form of a discussion of alternations of generations, and a brief but suggestive chapter on fossil archegoniates. In the former we are glad to notice that there is an indication of a tendency to seek for physiological explanations of the remarkable facts of alternation of generations — this in the last few paragraphs.

The book, we may say in closing, is the product of much study and betokens a dashing vigor of mind which attains the large ends in view, and it should continue to be an important stimulus to a better knowledge of the forms which botanists in this country know rather too little about.

F. E. LLOYD.

Farlow's Bibliographical Index of North American Fungi*

The magnitude of the work begun by Professor Farlow under the above title is apparent from the fact that this first part, consisting of over three hundred pages, covers only the genera anterior to *Badhamia* in the alphabetical sequence. In the inter-

* Farlow, W. G. Bibliographical Index of North American Fungi. Vol. 1. Part 1. Carnegie Institution of Washington, Publication No. 8. 1905. 8vo, i–xxxv + 1–312.

esting preface is a history of the circumstances under which the conception of such a work originated and developed. "North America" is construed in its widest sense, including the West Indies, Bermuda, and the continent north of the Isthmus of Panama. The species are arranged alphabetically under their respective genera and the citations of literature are disposed chronologically under each. The literature lists impress one as being very full, though any attempt to make them complete is modestly disclaimed; they have been compiled with the idea of lightening the labor of the systematic mycologist and papers of a purely technical or agricultural bearing and many of a physiological character have been omitted. The Bacteria and Saccharomycetes are not included.

In a work dealing so largely with plant names, the author's views on the "scabrous subject" of nomenclature are of especial interest and one is not disappointed in finding them tersely and forcibly expressed in the preface, partly as follows: "At the present day the Sylloge of Saccardo and the Pflanzenfamilien of Engler and Prantl may be said to be the two works on the classification of fungi in most general use, and we have preferred to follow them as far as possible. * * * There are two categories of botanists: those who believe that nomenclature is an end rather than a means, to whom the changing of names to adapt them to a uniform, automatic system, seems to be the important aim in science; and those who regard nomenclature as a necessary evil which can be mitigated by making as few changes as possible. Of these two categories, it is hardly necessary to say that we should prefer to be classed with the latter. * * * It is best not to make too violent attempts to interpret the older mycologists but to be content with letting the dead bury their dead. The business of reviving corpses has been carried altogether too far in mycology." After perusing this conservative platform, one is slightly shocked to find the author adopting *Albugo* of S. F. Gray, revived by Otto Kuntze and by Schröter, for the genus for which the name *Cystopus* had become "classic" in both taxonomic and morphological literature — a name which the next International Botanical Congress, if the committee having the

matter in hand happens to be suitably constituted, may place upon its list of *nomina conservanda*. This support of a Kuntzean innovation by one who prefers to be classed among those who change names as little as possible inclines us to the belief that the line of division between his "two categories of botanists" is perhaps as elusive as the limits of some of the currently accepted genera of the larger fungi. It is a pleasure to note that the oldest specific name is maintained, — a practice which, happily, already has the sanction of most mycologists. The author's remark that *Agaricus campestris* L. is the type of the genus *Agaricus* is of interest in connection with Dr. Murrill's recent action in taking *Agaricus quercinus* L. as the type and thus transferring the name *Agaricus* to the genus ordinarily known as *Daedalea*.

Critical notes and comments are numerous — mostly written by the author but partly by Mr. A. B. Seymour, whose coöperation in the work receives a special acknowledgement in the preface. The "Bibliographical Index of North American Fungi," as planned and thus, in part, executed, will prove a valuable timesaver and aid to American mycologists and will receive from them a most grateful welcome.

MARSHALL A. HOWE.

PROCEEDINGS OF THE CLUB

OCTOBER 10, 1905.

This meeting was held at the American Museum of Natural History, with President Rusby in the chair and twenty-two persons present.

A letter was read from Mr. Edward W. Berry, tendering his resignation as recording secretary of the Club owing to his removal to Baltimore. Dr. Chamberlain moved that the resignation be accepted and that a letter be sent to Mr. Berry, expressing to him the Club's high appreciation of his services and the regret of the Club at his removal. This motion was carried by a unanimous vote.

The announced program for the evening consisted of informal

reports on the summer's work and observations. Several from whom reports were expected were unable to be present.

Professor Francis E. Lloyd gave an account of his summer's experiences at the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona. On the way thither a visit was made to the Tularosa Desert in southern New Mexico. This desert is largely an old lake-bed of a comparatively recent geological period. The moving white sands which compose the desert overlie the *mesa* and consist chiefly of gypsum, and a little below the surface there is a considerable amount of available water, which, however, is saline. The vegetation of the region is peculiar, showing various adaptations to the intense light. Several interesting cases were observed showing how Yuccas and other plants are able by continued vertical growth to keep their tops above the drifts of sand and how in the process they help to build up and hold the dunes. *Rhus trilobata* and also a shrubby labiate form very marked pillar dunes. The gypsum sand is partly soluble and it solidifies about the vertically elongating roots and stems; the outer parts of the dune may then erode and be removed by the wind, leaving an isolated pillar-like mass surmounted by the tops of the living shrubs. An interesting and not especially common plant of the region of Tucson is *Cereus Greggii*, of a habit so peculiar and aberrant that it does not seem to be a *Cereus* at all. Like certain other desert plants it has an underground storage system which is very large in comparison with the above-ground parts. The rapidity with which foliage appears on desert plants after rains has been often noted and it has been a question in how far growth of leaves may be stimulated by the direct access of water to the above-ground parts without the intervention of the root-system. This point was tested during the past summer by experiments at the Desert Botanical Laboratory. By means of a siphon, water was supplied directly to the leaf-buds and stems, in such a way as to prevent the water from reaching the ground. It was found that the desert plants thus stimulated produce leaves in the course of a few days. Very noticeable changes occur within twenty-four hours, both when plants are stimulated as described and after natural irrigation by

rains. Professor Lloyd further observed diurnal nutations and nyctitropic movements in an amaranth growing near the Desert Laboratory. Photographs were shown illustrating the observations commented upon.

Dr. William A. Murrill spoke briefly of his collections of fungi during the summer at Ohio Pyle, Pennsylvania, in the District of Columbia, and in the Mt. Katahdin region of Maine, describing also some of his camping experiences in the Maine woods. Dr. Murrill was impressed by the boreal character of the fleshy fungi found about Mt. Katahdin, many of them recalling species that he had collected in Sweden.

President Rusby reported on a Torrey Club excursion to Pompton Plains, New Jersey, where *Capnoides flavulum* was among the rare plants obtained; also on a club excursion to Great Island, New Jersey. Great Island is a hummock of sand surrounded by a salt marsh and lying between Newark and Elizabeth; it has numerous interesting plants, some of them being characteristic of the pine-barren flora of the region further south.

Professor E. S. Burgess remarked upon his summer's visit to the Pacific Coast. Collections and field studies of asters were made in New Mexico, Arizona, California and Oregon. Mt. Hood, Oregon, proved an especially interesting field. Asters were found growing there in close proximity to snow and ice.

Mrs. Britton alluded briefly to collecting experiences in Bermuda during September. Most of the species of ferns, mosses and hepatics are found there only in the "caves" or sink-holes. Her collections indicate considerable additions to the list of mosses published in the Report of the Challenger Expedition.

Dr. J. H. Barnhart spoke of the International Botanical Congress held at Vienna in June, which he attended as a delegate from the New York Botanical Garden.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

NEWS ITEMS

Dr. J. N. Rose and Mr. J. N. Painter, of the U. S. National Herbarium, returned to Washington late in September from a three or four months' collecting expedition to Mexico.

Mr. William R. Maxon, of the U. S. National Herbarium, has been spending a month at the New York Botanical Garden engaged in a study of Central American and West Indian ferns.

Dr. Charles F. Millspaugh, of the Field Columbian Museum, Chicago, was at the New York Botanical Garden for two weeks in the latter part of October and the first part of November, studying some of his collections of Bahamian plants.

Mr. H. A. Gleason, A.M., recently instructor in botany in the University of Illinois, is pursuing graduate studies in botany in Columbia University. Mr. Harlan H. York, A.M., recently assistant in botany in the Ohio State University, is the present incumbent of the fellowship in botany in Columbia University.

Roland M. Harper, Ph.D. (Columbia, 1905), who has been occupied with botanical studies at Columbia University and the New York Botanical Garden for a large part of the last six years, has accepted a position with the Geological Survey of Alabama, with headquarters at University, Ala. He will be engaged for several months in a study of the economic plants of that State and also, incidentally, of some phytogeographical problems.

In the Ludwick Institute courses of free lectures on the natural sciences and their applications, under the auspices of the Academy of Natural Sciences of Philadelphia, the program for 1905–1906 includes a course of five lectures in November and December by Dr. John W. Harshberger under the general title of a "Scientific Account of Marvelous Plants" and a course of five lectures in February and March by Mr. Stewardson Brown on "Wild Flowers and Seasons."

Botanical visitors in New York since July 15, not otherwise mentioned in TORREYA, include P. L. Ricker, Washington, D. C.; Dr. Robert B. Wylie, Morningside College, Sioux City, Iowa; Professor F. L. Stevens, Raleigh, N. C.; Eugene A. Rau, Bethlehem, Pa.; C. O. Rosendahl, University of Minnesota; S. H.

Burnham, Albany, N. Y.; Professor George Macloskie, Princeton University; President Ezra Brainerd, Middlebury College, Middlebury, Vt.; Perley Spaulding, St. Louis, Mo.; Dr. Duncan S. Johnson, Johns Hopkins University, Baltimore, Md.; Dr. E. H. Eames, Bridgeport, Conn.; W. H. Blanchard, Westminster, Vt.; David G. Fairchild, U. S. Department of Agriculture; and Professor George E. Stone, Amherst, Mass.

Mr. R. S. Williams returned to New York on October 24 from a two years' visit to the Philippine Islands, where he has been making botanical collections for the New York Botanical Garden. His collections, which include spermatophytes, pteridophytes, bryophytes and lichens, have been secured in central and northern Luzon, in southern Mindanao and in Jolo. Mr. Williams had the misfortune to lose the results of about three months' work by a fire, but his collection remains one of the most extensive and doubtless the best in quality of any that have been brought from the Philippines.

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TORREYA

December, 1905

A STATISTICAL METHOD FOR COMPARING THE AGE OF DIFFERENT FLORAS

By Roland M. Harper

It is a well-known principle of phytogeography that when an area devoid of vegetation and true soil, such as one which has recently been covered with water or ice for a long period, is first invaded by plants, the lower forms tend to predominate at first, and gradually pave the way for higher ones.* It is also generally conceded by botanists that monocotyledonous plants as a class are of lower rank than dicotyledons. Putting these two conceptions together, a method is at once suggested for determining roughly the age of a given flora, for a study of the relative proportion of monocotyledons and dicotyledons in any essentially homogeneous region ought to throw some light on the length of time that that region has been continuously occupied by vegetation.† The application of this method, crude as it may seem, gives some remarkably consistent results for regions believed to be of the same age geologically.

The glaciated region of the northern states is believed to have been entirely devoid of vegetation — at least as far as flowering plants are concerned — as late as fifteen or twenty thousand years ago ; and most of the coastal plain of the southeastern states was probably submerged beneath the sea at about the same time.

* Prof. N. S. Shaler's very interesting paper on "The origin and nature of soils" (12th Ann. Rep. U. S. Geol. Surv., pp. 213 et seq.) should be consulted in this connection.

† This method is so simple that it can hardly be claimed as original, but it probably has not been applied to so many different parts of Eastern North America before. MacMillan came very near it in some of the statistical discussions in his "Metaspermae of the Minnesota Valley" in 1892, but did not use it for comparison in this way.

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The floras of these two regions ought therefore to be among the most recent in existence. The southern Alleghanies and adjacent Piedmont region, on the other hand, have probably been continuously covered with vegetation ever since the Palaeozoic period, a time long antedating the appearance of any species of plants now living.

Below are given the proportions of monocotyledons to the total number of species of angiosperms in several parts of temperate Eastern North America whose floras have been written up with some care. After the name of each region are given the author and date of the flora from which the statistics were derived, and then the percentage of monocotyledons. It is of course only native plants that are of significance in this connection, but in some local floras no distinction is made between native and introduced species. So two columns of percentages are given, one for native species alone and the other for native and introduced.

The regions in the first list are wholly included in the glaciated region.

	Native	Native and Introduced
Maine (Fernald, 1892),		29
Vermont (Brainerd, Jones & Eggleston, 1900),	35.7	32.3
Essex County, Massachusetts (Robinson, 1880),		30.6
Middlesex County, Massachusetts (Dame & Collins, 1888),	35	30.6
Worcester County, Massachusetts (Jackson, 1894),		28.4
Amherst and vicinity (Tuckerman & Frost, 1875),	34.3	32.2
Connecticut (Bishop, 1901),		30
New Haven and vicinity (Berzelius catalogue, 1878),		29.2
Southington, Connecticut (Bissell & Andrews, 1902),	31	28
Cayuga Lake basin, New York (Dudley, 1886),		31.8
Monroe County, New York (Beckwith & Macauley, 1896),		30
Michigan (Beal, 1904),		30
Minnesota Valley (MacMillan, 1892),		28.4

New Jersey is about half coastal plain and the remainder of the state mostly glaciated. The corresponding figures for it (Britton, 1889) are 33.2 per cent. and 29.3 per cent.

The following areas lie wholly in the coastal plain :

	Native	Native and Introduced
Dismal Swamp and vicinity (Kearney, 1901),		30.9
Vicinity of Wilmington, N. C. (Wood & McCarthy, 1887),		28.6
Okefinokee Swamp and vicinity (Harper, ined.),		29.3

	Native	Native and Introduced
Altamaha Grit region of Georgia (Harper, 1906),	30	29.6
Florida (Hitchcock, 1899–1901),		28.4
Lee County, Florida (Hitchcock, 1902),		34.9
Plaquemines Parish, Louisiana (Langlois, 1881),		29.4
Lower Louisiana (Langlois, 1887),		28.5

It is rather unfortunate that local floras of parts of Eastern North America which include neither coastal plain nor glacial drift are not numerous. There is not yet even one for the southern Alleghanies from which any such calculations as these can be made. The following regions, however, include none of the Pleistocene areas above mentioned, or such a small proportion of them that it does not seriously impair the results.

	Native	Native and Introduced
Chester County, Pennsylvania (Darlington, 1853),	27	25.7
West Virginia (Millspaugh, 1892),	21.8	20.6
West Virginia (Millspaugh & Nuttall, 1896),		20.7
Tennessee (Gattinger, 1901)		24
Jackson County, Missouri (Mackenzie & Bush, 1902),		27
Athens and vicinity, Middle Georgia (Harper, 1900),	19.8	
Metamorphic region of Alabama (Earle, 1902),	26.7	25.6

In this list some of the percentages which are higher than the averages are capable of explanation. In Chester County, Pennsylvania, Muhlenberg's work on the grasses and sedges of the vicinity early in the century may have had something to do with the relatively high proportion of monocotyledons recorded. And in Earle's Flora of the Metamorphic Region of Alabama the southern boundary of the region is so loosely drawn (as the author admits in his preface) that a considerable coastal plain element is included.

The discrepancies between different figures in any one of these three lists may be due as much to personal equation as anything else, and it is remarkable that they are not greater. But with all sources of error included, the above statistics nevertheless seem to show that no glaciated or coastal plain area contains less than 30 per cent. of native monocotyledons, while none of the older regions has more than 27 per cent. If authors of future local floras will bear this method in mind and tabulate their species

accordingly we can ultimately determine how universally this relation holds good. It is interesting to note that in every case above where both figures are given there is a smaller proportion of monocotyledons among the introduced species than among the natives.

In applying this statistical method to other regions some cautions must of course be observed. For instance, extreme accuracy could not be expected where the number of species involved is much less than a thousand. And it would hardly be advisable to compare areas too widely separated, for the proportion of monocotyledons may vary considerably on different continents, or in different climatic zones.

A similar method applied to different habitats in the same region indicates roughly not the age of the flora of each habitat but its affinities with other regions and its place in the order of succession. In the Altamaha Grit region of Georgia for instance, the flora of river-bluffs, which represent the extreme of mesophytic conditions for that region and have about 90 per cent. of species in common with the Piedmont region and mountains, contains only 13 per cent. of monocotyledons. On the other hand the moist pine-barrens have only about 20 per cent. of their species ranging beyond the limits of the coastal plain, and 44 per cent. of monocotyledons.

Some other kinds of statistics may perhaps hereafter be found equally useful for the same purposes. For example, the ratio of Gamopetalæ to Polypetalæ, of grasses to sedges, or of woody plants to herbs. In the glaciated region and coastal plain, sedges seem usually to outnumber the grasses, while the reverse is true in most other parts of the world; and woody plants tend to be more numerous in old regions than in new, if the climatic conditions are not too different.

ARTIFICIAL COLORING OF FLOWERS

By Henry Kraemer

In the *Popular Science Monthly* for August there is an interesting account of "A Visit to Luther Burbank" by Professor de Vries, and in commenting on the production of a blue poppy by Burbank he advances the idea that "probably the change in color is caused by the combination of pigments in some flowers and the chemical constituents of cells of others." For several years I have been making a study of the color substances of plants both chemically and microscopically, and my results have led me to suppose that changes in the colors of flowers could be effected by cultural methods, that is, by feeding the plants with certain chemicals. For about a year I have been carrying on experiments along this line, but so far have obtained no marked results. This may be due to the fact that I have not yet attained exact control conditions, or that the proper chemicals have not been used, or we may find that it is not possible radically to change any of the so-called inherent characters of plants, of which color is one.

In the course of my work I have also become interested in the artificial coloring of flowers. I have used both plant color-substances and aniline dyes, obtaining the most satisfactory results with the latter class of substances. Aqueous solutions of these dyes were supplied the living plant through the soil, or stems of cut flowers were placed directly in the solutions. While I have actually succeeded in getting the growing plant to take up some of these substances under control conditions, as in the production of a blue carnation, the most striking results have been obtained with cut flowers. When the flowers are not too far advanced even though they have been cut several days, the effects are frequently observed in from 10 to 15 minutes, and usually in less than an hour the maximum effects are obtained. Apparently all white flowers will take up the dyes which I shall enumerate, being changed to yellow, orange, blue, green, purplish-red or magenta, crimson, purple, salmon-pink and gray.

These dyes may be used also to intensify flowers having a pale color, as of pale-yellow carnation, pink rose, etc. In some cases the natural colors can be modified, as in the production of a yellowish-red flower of snapdragon from a yellow flower. In the accompanying table the following data are given :

1. The colors produced in white flowers when the stems are placed in aqueous solutions of the dyes.
2. The common names of the dyes.
3. The composition of the dyes.
4. The colors of the dyes or mixtures used.
5. Colors of the aqueous solutions.

Color Produced in White Flowers.	Common Name of Dye.	Composition of Dye.	Color of Dye or Mixture.	Color of Aqueous Solution.
Canary yellow.	Acid Yellow A. T. (C).	Sodium salt of disulpho-diphenylazin-dioxytartaric acid.	Bright orange-yellow.	Golden-yellow.
Orange.	Orange G. G. (C).	Sodium salt of benzene-azo-B-naphthol-disulphonic acid.	Yellowish- or carmine-red.	Brownish-red.
Blue.	Cyanole F. F. (C).	Sodium salt of metaoxy-diethyl-diamidophenyl-ditolyl-carbinol-disulphonic acid.	Dark-blue.	Deep purplish-blue.
Green.		A mixture of equal parts of Acid Yellow A. T. and Cyanole F. F.	Deep bluish-gray.	Dark-green.
Purplish-red or magenta.	Acid Magenta (C).	Sodium salt of the tri-sulphonic acid of rosaniline.	Deep-brown.	Purplish-red.
Crimson.		A mixture of equal parts of Acid Yellow A. T. and Acid Magenta.	Yellowish-brown.	Crimson.
Purple.		A mixture of equal parts of Cyanole F. F. and Acid Magenta.	Grayish-blue.	Purple.
Salmon-pink.	Brilliant Croceine M. O. O. (C).	Sodium salt of benzene-azo-benzene-azo-B-naphthol-disulphonic acid.	Brick-red.	Light-crimson.
Pale salmon-pink.	Crystal Scarlet 6 R. (C).	Sodium salt of a naphtylamine-azo-B-napthol disulphonic acid.	Reddish-brown crystals with golden reflect.	Rose-red.
Dark gray or blackish.	Naphtol Black B. (C).	Sodium salt of disulpho-B-naphthalene-azo-A-naphthalene-azo-B-naphtol-disulphonic acid.	Bluish-black.	Deep violet.

These dyes are readily soluble in water, and the solutions are made by simply dissolving the dye in water, the proportion being about 1/8 ounce of dye to 1 pint of water. This solution can be diluted as much as ten times and still be effective. When the desired effect has been produced, which is usually in an hour or less, the flowers should be transferred to water. The solutions will keep for some days, and a pint of solution will color a large number of flowers.

While the artificial coloring of flowers in the manner described is of more or less interest from the scientific point of view, it has also a practical application. In decorative schemes where a particular color is selected, this method could be used for producing flowers all of one color. Or in some instances, where the demand for flowers of a certain color is greater than the supply, artificially colored flowers could be produced from white ones. Then again in the production of novelties, as of green carnations and green roses, the method can be utilized. The color produced by Naphtol Black B is a delicate gray or grayish-black, and it has been suggested that roses and carnations so colored would furnish appropriate mourning flowers. Another use of these dyes is in the coloring of wild flowers for decorative purposes. For example, wild carrot when colored with the blue dye gives a beautiful effect, being suggestive of a head of small forget-me-nots.

Finally it should be stated that the odor of flowers is not affected by this treatment, and that they keep as well as cut flowers ordinarily do. The colors are furthermore, permanent, and when the flowers are preserved in the dried condition, as is sometimes done with hydrangeas, a color can be selected according to the fancy, as blue, green, yellow, red, and so on.

Philadelphia College of Pharmacy.

A KEY TO THE AGARICEAE OF TEMPERATE NORTH AMERICA

By William A. Murrill

The Agariceae are not ordinary gill-fungi, but are a subfamily of the Polyporaceae with furrowed hymenium. They differ from

the plants usually called agarics in being corky or woody instead of fleshy. Many of the species are very difficult because of the wonderful variations they undergo, especially in the appearance of the hymenium.

KEY TO THE GENERA.

Context white.
- Surface glabrous, hymenium usually labyrinthiform. A. AGARICUS.
- Surface pubescent or hirsute.
  - Hymenium at first labyrinthiform, soon becoming irpiciform. B. CERRENA.
  - Hymenium lamellate, not becoming irpiciform. C. LENZITES.

Context brown.
- Hymenophore sessile, furrows radiate. D. GLOEOPHYLLUM
- Hymenophore stipitate, furrows concentric. E. CYCLOPORUS.

A. THE SPECIES OF AGARICUS

1. Tubes one to several millimeters in transverse diameter; surface usually brown or discolored. 2.
   Tubes less than one millimeter in transverse diameter; surface white or yellowish; plants confined to the southern states. *A. Aesculi* (Schw.) Murr.

2. Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context wood-colored; plants abundant on oak and chestnut. *A. quercinus* L.
   Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context white; plants rare on red cedar. *A. juniperinus* Murr.
   Pileus thin, applanate, multizonate, margin very acute; hymenium poroid, daedaleoid or lamelloid, dissepiments acute. *A. confragosus* (Bolt.) Murr.

B. THE SPECIES OF CERRENA

Surface hairy, hymenium soon splitting into numerous teeth; plants very common on dead deciduous wood. *Cerrena unicolor* (Bull.) Murr.

C. THE SPECIES OF LENZITES

Surface tomentose, hymenium lamellate; very common on dead wood. *Lenzites betulina* (L.) Fr.

D. THE SPECIES OF GLOEOPHYLLUM

1. Context ferruginous to chestnut. 2.
   Context avellaneous to umber, furrows only half a millimeter in width, surface usually azonate. *G. pallidofulvum* (Berk.) Murr.

2. Surface hirsute. *G. hirsutum* (Schaeff.) Murr.
   Surface finely tomentose or glabrous. *G. Berkeleyi* (Sacc.) Murr.

E. THE SPECIES OF CYCLOPORUS

A rare and remarkable plant, easily known by its concentrically furrowed hymenium and central stipe. *Cycloporus Greenei* (Berk.) Murr.

NEW YORK BOTANICAL GARDEN.

SHORTER NOTES

THE CUBAN COLUMNEAS. — The mountains of eastern Cuba contain two species of this genus of Gesneriaceae. *Columnea tincta* Griseb., based on Wright's *no. 358*, collected on tree-trunks in the forest near Monteverde is a climbing vine with a bright-red calyx and yellow corolla ; it was found also by Baron Eggers near Pinal de Santa Ana (*no. 5050*), also by Linden on Mt. Liban near Santiago (*no. 1962*), and on El Yunque mountain near Baracoa by *Pollard & Palmer* (*no. 171*) and by *Underwood & Earle* (*no. 1013*).

Columnea cubensis (Urban) Britton (*C. sanguinea* var. *cubensis* Urban, Symb. Ant. **2** : 359 ; *Collandra sanguinea* Griseb., not *Besleria sanguinea* Pers.), based on Wright's *no. 357* from eastern Cuba, is also a vine growing on trees, as observed by Professors Underwood and Earle in collecting their *no. 869* at Cooper's Ranch, base of El Yunque ; it was also found by Baron Eggers on the Pinal de Santa Ana (*no. 5049*). A comparison of the specimen collected by *Underwood & Earle* with the Haïtian *Columnea sanguinea* (Pers.) Hanst., as illustrated by *Nash & Taylor, no. 1167*, from Mount Maleuvre, shows that the Cuban plant is distinct. I am indebted to Dr. B. L. Robinson for an examination of Wright's specimen.

N. L. BRITTON.

ASTRAGALUS LOTIFLORUS NEBRASKENSIS.* — It is a curious fact that the plant described in the *American Naturalist* by me in 1895 should not have been reported by any one since. I have been studying it continuously and have found it since then in four towns and three additional counties of Nebraska : Ainsworth, nine miles from the original find ; Callaway, Custer County, eighty to ninety miles south, where it was fairly abundant ; Red Cloud, Webster County, three large plants, one hundred miles southeast of Callaway ; and in two towns and counties west of Red Cloud, viz. : Naponee, two or three large plants ; and Orleans, one plant. In the northern station, *A. lotiflorus* was very common in both forms, the long-peduncled and

* Bates, Am. Nat. **29** : 670. 1895.

the short. In this southern station, *A. lotiflorus* has not been found in three years of collecting. As my plant seeds lavishly here, its scarcity cannot be easily accounted for. The Red Cloud plants have all been heavily affected with Astragalus-rust (*Uromyces Astragali*), but the seeds have matured well, at least five hundred on one plant. These southern plants vary in no particular from the original find, except that they average larger, the largest spreading two feet in diameter.

As the result of these studies, and of the use of the term "species" in modern literature, it has seemed best to give the plant specific rank. I am utterly opposed to the subdivision that has characterized *Crataegus* and some other genera of late. But the more I see of this form, the less it resembles *A. lotiflorus*. That is very variable. This is invariable. The resemblance lies in size and color of the flower. If I had found it first here, with its plants of noble size and unassociated with *A. lotiflorus*, I can see that I should not have thought of it as a variety, but as a congener.

It is accordingly now published as **Astragalus nebraskensis** Bates. The name seems most appropriate, and the original description holds good in every particular but the size.

J. M. Bates.

Red Cloud, Nebraska.

A curious Cactus Fruit. — One day early in August an odd looking "joint" of a prickly pear cactus (*Opuntia Engelmannii*) was observed on a plant not far from the laboratory building. It was somewhat smaller than the other joints of the year; like them it was spinose, but instead of being green over the whole surface a portion of it was dark-red. Upon closer inspection the red portion was seen to be somewhat thicker than the remainder and bore a flower scar on its tip. A longitudinal section of the joint showed the red part to be fruit with a red fleshy outer portion and many seeds. The following measurements were taken: Length of joint, 8 cm.; width, 5 cm.; length of the fruiting portion, 3.4 cm.; width, 2.5 cm. A normal fruit from a neighboring plant of the same sort measured in length 4.5 cm., and in width 3.5 cm.

This is the only monstrosity of its kind on this species which has come to my notice. It is of interest to note the resemblance of fruit and joint in such cylindrical opuntias as the cholla (*O. fulgida*), in which there occurs normally and year after year a budding-out from fruits in manner apparently quite like the branching of the joints of the plant. As a consequence of this proliferation and where undisturbed the fruits of cholla are very numerous, forming large clusters. In other opuntias also the fruits bear both spines and prickles and in this habit they recall the purely vegetative part of the plant. Whether, however, the peculiar fruit of the prickly pear above described is to be considered as indicating a caulomic tendency as exhibited by cholla and in other ways by other opuntias might be questioned.*

W. A. CANNON.

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REVIEWS

Christensen's Index Filicum †

The lack of a satisfactory index to the species of ferns has been one of the greatest drawbacks to the systematic study of this group of plants. Moore's attempt ‡ in the early sixties proved unsatisfactory and incomplete, since the printing ceased before the genera commencing with the letter G were completed. The parts that were published are not sufficiently exact for present day citation, since dates of publication were rarely given. Salomon's Nomenclator§ was carried through the alphabet but was incomplete at best and gave no citations whatever, thus proving a scarcely useful list of mere names. The need of a thorough index has been so much the more keen (1) since

* Compare also the sketch of *Opuntia Ficus-indica* in Engler & Prantl's Die Natürlichen Pflanzenfamilien, 3^{6a}: 170, in which the fruit is shown sending out roots and new shoots quite like the joints of the plant.

† Christensen, C. Index Filicum, sive enumeratio omnium generum specierumque Filicum et Hydropteridum ab anno 1753 ad annum 1905 descriptorum adjectis synonymis principalibus, area geographica, etc. Hafniae 1905 apud H. Hagerup. [Price 3s. 6d. per fascicle.]

‡ Moore, T. Index Filicum. London, 1857–1863.

§ Salomon, C. Nomenclator der Gefässkryptogamen. Leipzig, 1883.

Hooker & Baker's *Synopsis Filicum* (1867–74), by omitting most synonyms and most species not represented in the Kew herbarium, does not account for more than two thirds of the species now recognized as valid from among those published before 1874; and (2) because the unwonted activity in fern study in the last generation has resulted in adding nearly two thirds as many more species to the list as were recognized in 1874. Baker* attempted to supply this latter deficiency in 1891 in a list of about 1,100 species described between 1874 and 1891, but these were arranged in accordance with the Kew conception of specific sequence, instead of alphabetically, and the work has always been difficult for rapid consultation. Since 1891 more species have been described than in any corresponding period since species-writing commenced.

At last, we have the beginning of a modern, accurate index of the orders Ophioglossales, Marattiales, and Filicales, and the five fascicles (320 pages) already published promise to furnish a much more valuable reference book for the fern students than the corresponding *Index Kewensis* has proved for students of the higher plants, largely because it is being prepared by a fern specialist who is familiar not only with fern literature but with ferns themselves. It gives in alphabetical sequence all names published under each genus, using practically the American system of citation and referring synonyms to the proper genera in the same line. From an American standpoint, the work lacks only one element to make it complete and that is the citation of the type collection number or type locality of the original species described, but this was too much to expect from a European standpoint since the importance of the problem of type localities has not yet permeated European taxonomy as it is sure to do in the near future.

The work is an essential to every student of ferns, and should be in every botanical library. It is the more important that friends of botany should see that subscriptions are placed in

* Baker, J. G. A summary of the New Ferns which have been discovered or described since 1874. Oxford, 1892. [Originally published in Annals of Botany, **5**: 181–221, 301–332, 455–500. 1891.]

public and college libraries since the publication is undertaken as a personal venture by Herr Christensen and up to date, only sufficient subscriptions are received to pay for one half the actual expense of printing and its completion is dependent on doubling the present list of subscribers.

The nomenclature is mainly a rational one, following largely *Die natürlichen Pflanzenfamilien* but giving attention to more recent monographic work. It will probably shock some of our more conservative (?) fern students that he takes up *Dennstaedtia*, *Cyclophorus* (for *Niphobolus*), and (following Professor Urban's example from Berlin) *Dryopteris* for *Nephrodium*. Some of the larger genera may prove a surprise in the number of species listed under them, as, for example, *Acrostichum* 750,* *Adiantum* 520, *Alsophila* 380, *Aspidium* 1,400, *Asplenium* 1,600, *Davallia* 360, etc. This will also give some idea of the magnitude of the accurate, painstaking and indispensable work for which the whole fern world is under an eternal debt of gratitude to Herr Christensen.

LUCIEN M. UNDERWOOD.

COLUMBIA UNIVERSITY,
Dec. 14, 1905.

PROCEEDINGS OF THE CLUB

OCTOBER 25, 1905

The Club met at the New York Botanical Garden, with Professor Underwood in the chair and 18 persons present.

The following new members were elected: Dr. C. Stuart Gager, Morris High School; Mrs. Robert T. Morris, 152 West 57th St.; Miss Pauline Kaufman, 173 East 124th St.; Miss Daisy Levy, 329 West 83d St.; Mrs. Henry Dinkelspiel, 254 West 88th St.; Dr. Charles C. Godfrey, 340 State St., Bridgeport, Conn.

The announced program consisted of "Further Remarks on the Vegetation of the Bahamas," by Drs. N. L. Britton and C. F. Millspaugh.

* These are given in round numbers and of course include many species now referred to other genera and many more synonyms of other species in the list. Of the 750 listed under *Acrostichum* only three are printed in the bold-face type which indicates species which still stand under the genus.

Dr. Millspaugh in opening the discussion remarked that the flora of the Bahamas is so locally distributed that all the islands must be visited before a complete enumeration can be attempted, and that a thorough exploration of the archipelago at an early date is very desirable. He then reviewed the history of the exploration of the Bahamas, mentioning the work of Brace, Britton, Catesby, Coker, Cooper, Eggers, Hitchcock, Howe, Madiana, Millspaugh, Nash, Mrs. Northrop, and Swainson (?); and summarizing the work done upon each island.

It is pretty certain that the islands have been all submerged at a very recent geological period, so that the question as to whether they were ever previously connected with the mainland has no significance for the present plant population. The flora seems to have more in common with Cuba and Haïti than with any other region.

Dr. Britton then described some of the noteworthy features of the flora, exhibiting specimens of several of the recently discovered endemic species and of the palms.

Dr. Howe discussed some of the marine algae of the Bahamas, remarking upon the apparently very local distribution of some of the species. He exhibited specimens of a new *Halimeda* and of a new genus, *Cladocephalus,* soon to be described by him in the *Bulletin.*

Dr. Barnhart remarked that he had recently found some evidence about one Swainson, who is supposed to have collected plants in the Bahamas between 1830 and 1842. Some doubts had been expressed as to whether this could have been William Swainson, the zoölogist, who is not known to have been in that part of the world at the time indicated, but the evidence goes to show that the specimens in question had been collected for Swainson by some unknown correspondent, and by him communicated to the herbarium at Kew where they are now found.

Dr. MacDougal exhibited a mounted series of leaves of two hybrid oaks, *Quercus Rudkini* Britton (supposed to be a hybrid between *Q. Marylandica* and *Q. Phellos*), the original specimens of which were recently found to be still growing near Cliffwood, N. J., and *Q. heterophylla* Bartr. (supposed to be a hybrid

between *Q. Phellos* and *Q. rubra*) from Staten Island. The specimens exhibited showed an interesting range of variation, and acorns of both hybrids have been planted, so that they can be studied hereafter in the light of recent theories of evolution.

Roland M. Harper,
Secretary pro tem.

November 14, 1905

This meeting was called to order by President Rusby in the American Museum of Natural History. Twenty persons were in attendance.

Dr. C. Stuart Gager was elected recording secretary to succeed Mr. Edward W. Berry, resigned.

The Rev. John Charles Roper, D.D., 3 Chelsea Square, New York City, was elected to membership.

The scientific program consisted of a paper by Dr. D. T. MacDougal on "Bud-Sports; Occurrence and Hereditary Qualities."

The speaker gave an outline of the subject of bud-sports and described some illustrative cases. Three striking examples from the cultures of the evening primroses in the New York Botanical Garden in 1905 were discussed. In one, a hybrid gave a flowering branch which sported into the characters of a sister hybrid; in the second, a fixed hybrid produced a branch constituting a reversion to one of the parents; a third, a mutant of the common evening primrose, produced a branch which resembled the parental form. Attention was called to the fact that all mutations are essentially vegetative and therefore a greater terminology would necessitate the use of the terms "bud-sport" or "bud-mutant," and "seed-sport" or "seed-mutant." While seed-mutants may theoretically be traced to one cell, it seems difficult to do this in the case of bud-sports. The action of the growing point in the protection of buds was illustrated with diagrams, and an enlarged photograph of one of the bud-sports was exhibited.

The paper was discussed by President Rusby and Professor Lloyd.

Dr. Tracy Hazen exhibited a hybrid between *Asplenium Ruta-muraria* and *A. Trichomanes* from Vermont.

Adjourned until the next stated meeting.

C. Stuart Gager,
Secretary.

NEWS ITEMS

Dr. Nathaniel L. Britton was elected president of the New York Academy of Sciences at the annual meeting held on December 18.

Francis E. Lloyd has resigned his professorship in the Teachers College, Columbia University, to become a member of the staff of the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona.

Professor William A. Kellerman, of the Ohio State University, sailed from New Orleans December 21 for Guatemala, where he will continue his collections and field studies of the parasitic fungi of that region. He is accompanied by a student assistant, Mr. A. W. Smith.

Dr. D. T. MacDougal has resigned his position as assistant director of the New York Botanical Garden to accept that of director of the department of botanical research of the Carnegie Institution of Washington. His address for the coming year will be Desert Botanical Laboratory, Tucson, Arizona, except from May 1 to September 1, when it will be the New York Botanical Garden.

The course of lectures and demonstrations in connection with the nature-study work of the 4 B grade of the public schools of the Borough of the Bronx, begun by the New York Botanical Garden as an experiment last spring, has been continued during the months of October, November and December, and has been extended so as to include also the work of grade 5 B. The exercises have been attended by nearly four thousand different pupils and teachers, those of grade 5 B attending three times, those of 4 B twice. Lectures have been given by N. L. Britton, H. H. Rusby, G. V. Nash, W. A. Murrill and M. A. Howe.

INDEX TO VOLUME V.

New names and the names of new genera and species are printed in boldface type.

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TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

JOHN TORRY, 1796-1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

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All business correspondence relating to the above publications should be addressed to Carlton C. Curtis, Treasurer, Columbia University, New York City.

* Resigned January 31, 1906.

ERRATA, VOLUME 6.

Page 111, 13th line, *for* A. A. Crooke, *read* J. J. Crooke.

Page 112, 13th line, *for* Britton, *read* Greene.

Page 135, 2d and 17th lines from bottom, *for* Schrenck *read* Schrenk.

Page 232, 4th line from bottom, for *C. aristata*, read *Phlox aristata.*

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No. 9,	September.	181–196.	September 27, 1906.
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No. 11,	November.	217–240.	November 26, 1906.
No. 12,	December.	241–272.	December 13, 1906.

Vol. 6 No. 1

TORREYA

January, 1906

POLARITY IN THE WEEPING WILLOW

By E. A. Andrews

The experiments of Vöchting showed marked polarity in the new growths from cut-off twigs of the osier willow when very young, but in older twigs and in some other species of willow less marked polarity. The following observations upon the older twigs of the weeping willow (*Salix babylonica*) show new growth of pieces without observed polarity. Being manifestly incomplete, they are published chiefly as suggestive of problems to be solved.

In October before the leaves had fallen, twigs 10–15 mm. thick and 30 cm. long were cut from a young weeping willow about ten feet high. The branches used were erect and not the pendent twigs. When these were put with one half in the water and the other in the air (not especially moist) they eventually formed roots in the water and leaf-buds in the air, whether the twigs were inverted or not. During the winter the leaf-buds elongated as branches 15 cm. long. The only leaves formed under water were from visible buds while in the air there were leaves formed in addition to those coming from visible buds. It was thought that the roots came out sooner from the basal ends in water than from the apical ends in water, but this may have been due to differences in temperature caused by one set of jars being nearer to the source of heat. Transplanted into earth, some lived several months, but both the inverted and the non-inverted twigs died.

In March and April, when the leaves were first showing green but had not yet expanded, twigs of the same small tree showed a marked ability to form roots from any part in water and leaves from any part in air, without difference between basal and apical

[No. 12, Vol. 5, of Torreya, comprising pages 207–233, was issued January 10, 1906.]

regions. Thus sticks 10–15 mm. thick and 60 cm. long were cut across into three and four pieces and the pieces of each tied in a bundle so that successive pieces of the same stick were alternately inverted and not inverted. Larger sticks 30 mm. thick and 90 cm. long were cut into pieces each 45 mm. long and smaller sticks 8 mm. thick and 60 cm. long were cut into pieces 30 cm. long. In each case the successive pieces were tied together side by side, one inverted the other not. In all cases the bundles standing upright in water with the upper half in the air showed within 48 hours roots growing in the water and leaves growing in the air, on all the pieces of sticks.

In those bundles of sticks cut across into *two* pieces the following combinations occurred. (1) The basal half-piece put out roots from its basal and leaves from its apical part while the apical half-piece put out leaves from its basal and roots from its apical part. (2) The basal half-piece made leaves from its basal and roots from its apical part while the apical half-piece made roots from its basal and leaves from its apical part. (3) The basal half-piece made leaves from its basal and roots from its apical part while the apical half-piece made leaves from its basal and roots from its apical part. In the first case the cut surfaces that used to join at the middle of the stick were side by side in the air; in the second case they were side by side in the water; and in the third case they were separated so that one was in the air and the other in the water.

The same response to air and water was shown again in a twig cut into basal, middle and apical pieces, which made roots from the basal and leaves from the apical part of the basal piece, leaves from the basal and roots from the apical part of the middle piece, and roots from the basal and leaves from the apical part of the apical piece. And when these three pieces were placed together again there were seen along the length of the twig: first some roots, a number of new side branches, another set of like branches, a second set of roots, a third set of branches and finally a third set of roots.

Even more striking appeared the succession of new growths upon a forked branch, when the pieces were restored to their nat-

ural sequence after having made new roots and shoots. Of the four pieces the basal made roots from its basal part and leaves from its apical part while the next piece, which was Y-shaped, made shoots from its basal part and roots from both its apical parts. Of the two terminal pieces, one made roots from its basal and shoots from its apical part while the other made shoots from its basal and roots from its apical part. In all cases roots arose in the water and shoots in the air.

The effect of water and of air was again shown in the case of a piece an inch and a half thick and nearly three feet long, which had put out roots from the basal part in water and shoots from the apical parts in air, but subsequently when so placed that water dripped upon its apex and ran down its entire length without accumulating at the base, put out new shoots amidst the basal roots and new roots amidst the apical shoots.

To see how very short lengths of pieces would behave, a few pieces were cut 32 mm. wide and from 8 to 65 mm. long. These were floated in shallow water, some base upward others apex upward. Those 65 mm. long made leaves in the air and roots in the water no matter which end was up. Some 17 mm. long made only leaves. One very short disk 32 mm. wide and 8 mm. deep put out one slight beginning of a shoot and of a root and here the root was above the shoot and toward the apex end. After many days these experiments were obscured by the drying out of the water.

Since roots were so readily made in the presence of water and shoots in the presence of air, some twigs were hung up in moist air after the method of Vöchting but with access of light and exclusion of free circulation of air. Hanging vertically, nearly, in moist air, these twigs might be expected to show any polarity they possessed, without the masking effects of the strong stimuli, water and air, applied in most of the above experiments at opposite poles.

Sticks 10 mm. thick and 60 cm. long were cut into three and four pieces, 15 to 20 cm. long and tied together in bundles so that successive pieces of each stick had base and apex downward alternately. The bundles were hung nearly vertically in a bell-

jar standing in water. In all the pieces roots came out all along the length and shoots all along the length. No difference was observed between the upper and the lower end of any stick whether it was inverted or not. With approximately equal conditions of air and moisture all along the sticks, the roots and shoots came out everywhere alike. They did not, however, come out from every part of the surface but from irregularly scattered spots widely distributed along the entire length and with no observed polar distribution. In a specific case of a twig cut into four pieces and suspended so that the original basal piece had its apex above, the next piece its apex below, the third its apex above, the fourth its apex below ; it was found that when the four pieces were placed together again in their original sequence they formed a long stick that bristled with short roots and with leaves along its entire length.

In these experiments in moist air, a callous tended to form over the cut surfaces, but no new growths were made from the cut surfaces nor from near the cut surfaces.

The roots came out from unseen lateral beginnings, while some of the leaf-bearing shoots came from visible buds and others from unseen beginnings.

In most cases the roots came out in groups of several close together and almost always in a row one above the other like fingers of a hand. While the roots could be seen for some days pushing out the green bark as conspicuous elevations before they broke through, there were many more elevations due to the swelling and bursting of lenticels. These changed a few hours after being put into water, or moist air, and finally exposed wax-like masses that made the surface of the twig thickly scattered over with white areas.

It would seem that these twigs of weeping willow contained very large numbers of lateral beginnings of shoots and of roots all along their lengths, or else have the power to form such beginnings, or else have both formed and facultative shoots and roots. When both water and air were present, large numbers of such organs grew forth all along cut-off twigs without observed reference to what was apical or basal. When, however, water

and relatively dry air were applied to opposite ends, a polar growth resulted with reference to these conditions only and not with reference to what had been basal or apical in the twig before separation from the tree. Apparently, possible leaves failed to be formed in water without much air and possible roots failed to be formed in air without much moisture.

In many of the above experiments twigs of an undetermined native willow were used in the bundles with weeping willow and without different results. The assumption that the weeping willow has acquired these innumerable centers of new growth as a means to produce new trees when branches happen to be broken off, may not be in the line of fundamental explanations to be sought for.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MD.

NOTES ON SOME SOUTHERN ILLINOIS PLANTS.—III

BY H. A. GLEASON

The two species of *Jussiaea* which extend into Illinois, *J. diffusa* Forsk. and *J. decurrens* (Walt.) DC., are of characteristically austro-riparian habit, and are always found in swamps or along streams. The former species is well distributed along the Mississippi on muddy banks with a gradual slope, and is able to live farther down the bank towards the water than any other plant except *Eragrostis hypnoides*. It is nowhere common and has so far not been observed except along the river. *Jussiaea decurrens*, on the other hand, is not found on the Mississippi side, but only along the Ohio River and its tributaries. It is very abundant among the Tertiary hills in Massac and Pulaski counties, and along the small streams flowing southward through the Carboniferous and Devonian regions in Pope and Hardin counties. The limited amount of field work done north of the Ozark uplift has not as yet revealed its presence there.

Jussiaea decurrens is of some interest because of the development of aërenchyma upon its subaquatic roots. This peculiarity

is found in a number of species of the genus and has been described by Schenck and others. Two types of aërenchyma formation may be recognized, depending on whether the plant grows in water or soil. In the latter case, the roots branch irregularly and extend downward into the soil. Some or all of them below the level of the ground-water are surrounded with a relatively thin layer of aërenchyma, which is easily torn off by pulling up the plant. The portion of the roots above the ground-water level are not so covered, unless the level has recently lowered. The plant usually grows in sand close to streams, where the water level is seldom more than one or two decimeters below the surface. When, as sometimes occurs, it grows along small muddy ditches, but with the water level beyond the reach of the roots, no aërenchyma is formed. It may be found growing also in shallow running water to a depth of two decimeters, and it is in such places that the aërenchyma is most richly developed. A number of roots radiate in fairly straight lines from the base of the stem, either upon or just below the surface of the soil, and extend a meter or more in length. At intervals along them are given off straight unbranched pneumatophores which grow vertically toward the surface of the water. Their diameter is small, about one millimeter, but they are thickly covered with aërenchyma so that the whole has a size of four to six millimeters. Their growth stops when they touch the surface of the water, but apparently may be resumed if the water rises. When the water falls the tips float with the current on the surface. New ones are constantly growing up and a well-grown plant may be surrounded by fifty or more of various lengths and ages. There are fewer of them on the roots which grow into shallower water, and when, as frequently happens, the plant grows just at the margin of the water the root system will show both types. The necessity of some such aërating device is very apparent in stagnant water but hardly evident for running streams.

In 1899 Dr. MacDougal delivered a lecture at Wood's Holl* on the influence of inversions of temperature on the distribution

* Biological Lectures from the Marine Biological Laboratory of Wood's Holl 1899: 37–47. 1900.

of plants, in which he showed that the northernmost limits of southern species might be expected on hill tops, other things being equal, and the southernmost limits of northern species in the valleys. By inversion of temperature is meant the cooling at night of the lower layers of air by conduction to the soil, so that they reach a temperature some degrees below that of the upper strata. In a hilly or broken country this cold air settles by its greater weight into the valleys and the hill tops are covered with a constant supply of warmer air, with the result that their average temperature is higher and extremes less marked than in the valleys below.

There are a number of facts connected with plant distribution which help substantiate this claim, and it would seem that inversions of temperature are of considerable importance in such a broken country as the Ozark region of Southern Illinois. Bald Knob, in Union County, is a somewhat conical hill, rising over 150 meters above the surrounding valleys, and nearly 100 meters above the general level of the country. Its total height is just 300 meters. The farmer who cultivates what little arable land there is on its summit is able to market his tomatoes some days before his neighbors and never loses his crop by late frosts in the spring. The first frosts in autumn are also two to three weeks later than in the surrounding country. The general effect of this condition on the native flora is seen all through the southern end of the state, where the southern flora, two or three hundred species of which occur, is found almost exclusively either on the highest and driest uplands or in the swamps. The former situation is probably due to a temperature relation, the plants finding there a temperature more nearly like that farther south, which in a measure compensates for the unfavorable soil. The latter situation, in the swamps, is due to a water relation, which being near the optimum, permits the growth of southern species in spite of the lower temperatures.

The distribution of the yellow pine, *Pinus echinata*, which here reaches its northernmost limit in the Mississippi Valley, may be taken as an example. It is confined to a few steep-sided narrow-topped ridges from 80 to 120 meters high, where the influence

of temperature inversions must be very marked. More interesting, however, is the behavior of certain species normally members of the swamp associations, which here are near or at their northern limits. They are *Rhamnus caroliniana*, *Adelia acuminata*, *Celtis mississippiensis*, *Planera aquatica*, and *Ilex decidua*. Of these all but *Planera* are abundant in the swamps along the Mississippi River bayous, and to some extent also in the cypress swamps along the Ohio River. But they occur also on the dry rocky sides and tops of certain hills in Jackson County, 50 meters or more above the bottoms, where the soil is a thin clay and the forest cover very loose. The appearance of these plants associated with such xerophytes as *Ulmus alata*, *Sassafras Sassafras* and *Rhus aromatica*, and surrounded by tufts of *Agave virginica*, *Solidago Drummondii* and *Pellaea atropurpurea* is *bizarre* in the extreme. *Liquidambar styraciflua*, which in Illinois is confined to the southern part, shows indications of the same distribution. It is abundant on the driest uplands and in the swamps, but infrequent in the mesophytic midlands. The small cane, *Arundinaria tecta*, which is abundant in all the bottom-land swamps, wet woods and along streams, is also occasional in the moister upland woods and even in the thin but moist soil-deposits on ledges of shaded cliffs. It is worthy of note that in 1902 the canes in the latter habitat bloomed, though apparently no others did.

Columbia University.

GRAYIA OR EREMOSEMIUM

By P. A. Rydberg

For sixty years a very interesting and rather handsome Chenopodiaceous shrub had borne the name *Grayia*,[1] named in honor of the immortal Asa Gray. In December, 1900, Dr. E. L. Greene replaced it by *Eremosemium*[2] under the plea that the former "dates from 1841 only; while another genus by the same name was published a year or two earlier." It would have been well if Dr. Greene had stated by whom and where this other *Grayia*

[1] Hook. & Arn. Bot. Beechey Voy. 387. 1840.

[2] Greene, Pittonia 4: 225. D 1900.

was published, as it would have saved other botanists a good deal of trouble. Turning to the Kew Index, which by the way is not infallible, one finds four genera named *Grayia* (spelled in various ways). Of these, all are published later than 1841, except *Grayia* Arnott[1] and *Grayia* Hook. & Arn. Dr. Greene gives 1841 as the year of publication of tne latter. This date is given also on the title-page of the Botany of Captain Beechey's Voyage, but the work was published in parts, a fact which I think is not unknown to Dr. Greene. The part containing the description of *Grayia* Hook. & Arn. was issued before June 1840. It was reviewed in the *American Journal of Science*[2] among botanical literature received from April to June 1840. Another evidence that the date of publication was in the earlier half of 1840, instead of 1841, is that *Grayia* Hook. & Arn. was republished and illustrated in the third volume of Hooker's Icones,[3] which also was issued in the earlier part of 1840, early enough to be reviewed in the same number of the *American Journal of Science*.[4]

Hence, both *Grayia* Hook. &. Arn. and *Grayia* Arnott were published in 1840. Now the question arises, which was published earlier in the year? To me all the evidences indicate that *Grayia* Hook. & Arn. was the earlier, for Endlicher in his Genera Plantarum,[5] published in the later part of 1840, took up Hooker and Arnott's *Grayia*, but made no reference to the one published in Steudel's Nomenclator. I think that the burden of proof falls on Dr. Greene to show that *Grayia* Arnott was published earlier than that of Hooker and Arnott.

But not even this is necessary, for in my opinion *Grayia* Arnott of Steudel's Nomenclator has no standing whatever. On page 705, the place of publication given, we find:

"**Grayia** *Arnot.*

"*Zeylanica Arn.* Andropogon Grayia."

The word *Grayia* is printed in a type which Steudel used to

[1] Steud. Nomencl. 1: 705. 1840. [Ed. 2.]

[2] 39: 172. 1840.

[3] 3: *pl. 271.*

[4] *Loc. cit.*, 178.

[5] Page 1376.

indicate synonyms and he refers it to *Andropogon Grayia.* This latter is found on page 91. Here we read:

"**ANDROPOGON** Lin.

* * * * * *

"Grayia *Steud.* Zeylon.

"Grayia zeylanica. *Arnott.*

"Schizachyrium zeylanicum. *Nees* in *Wight.* hrb."

There is no earlier publication of *Andropogon Grayia* Steud., and *Schizachyrium zeylanicum* Nees was not published until 1855,[1] and even then only as a synonym under *Andropogon Pseudograya.*

Grayia Arnott in Steudel's Nomenclator is therefore given on page 91 as a synonym of a *nomen nudum*, which has another *nomen nudum* as a synonym, and on page 705 it is published as a *nomen nudum* with a *nomen nudum* as a synonym. Publications of this kind nobody now-a-days holds as valid.

What threw Dr. Greene off the track was perhaps the fact that Hooker and Arnott in their original publication of *Grayia* mentioned an earlier *Grayia*, referring to Wight's no. 2033. Wight's Catalogue was never printed. Duplicate copies were sent out I think in 1833. Even if this by somebody would be regarded as a publication, *Grayia elegans* Arnott (note: not *G. zeylanica*) is at best a *nomen nudum*, for opposite the number 2033, this name only is given. "*Graya elegans*" was afterwards properly published by Steudel,[2] who stated that in his Nomenclator he had confused it with *Schizachyrium zeylanicum. Grayia* of Steudel's Nomenclator was therefore intended to be the same as the unpublished *Grayia* of Wight's catalogue.

Until somebody can show me that there is some other *Grayia* published before 1840, I feel obliged to reject *Eremosemium* and shall be pleased to use for the two Chenopodiaceous shrubs of the Rocky Mountain regions that time-honored name *Grayia* Hook. & Arn.

New York Botanical Garden,
December, 1905.

[1] Steud. Syn. Pl. Glum. 1: 365. 1855.

[2] Steud., *loc. cit.*, 1: 119. 1855.

RHUS AND ITS ALLIES

BY T. D. A. COCKERELL

The old genus *Rhus* has at various times been divided to form new genera. Authors to-day do not agree in their treatment of it. *Rhus* and *Cotinus* are generally recognized, the former containing very diverse elements. Dr. Small (Flora of the Southeastern States) separates four genera, *Cotinus*, *Rhus*, *Metopium* and *Schmaltzia*. Dr. Greene (Leaflets, 1905) calls Dr. Small's "*Rhus*," *Toxicodendron*, while part of his *Schmaltzia* is considered to be true *Rhus*.

At first sight, the separation of so many genera may seem questionable. In Dr. Small's table we find "Drupe with a glabrous outer coat; stone ribbed," and "Drupe with a pubescent outer coat; stone smooth," given as differential characters. Why might not these differences arise all at once, by mutation, in different series? What proof is there that they imply a deep-seated and fundamental segregation of types? I have before me a little piece of *Ceanothus velutinus laevigatus*, T. & G., from Ward, Colo., with many fruits. These are 3-lobed as usual, *except one, which is regularly and completely 4-lobed.* Is not this as good a difference as "drupe pubescent," and have we two genera here on this one fragment of a single plant?

There are, however, other reasons for supporting the dismemberment of *Rhus*. Judge J. Henderson and Dr. F. Ramaley, of the University of Colorado, recently made an expedition to the famous Tertiary beds of Florissant, Colorado, and brought back a fine series of fossil plants. At Fossil Stump Hill, they obtained a beautiful specimen of *Rhus*, which is now before me. It is the *Rhus coriarioides* Lesquereux, Cret. and Tert. Floras, 193. 1883. It is more perfect than the single specimen known to Lesquereux, as the tips of most of the leaflets are preserved. It is so close to *Rhus hirta* that there is little on which to separate it, beyond the fact that the tips of the leaflets are more produced and tapering, the distance from the last serration to the apex being about 16 mm., in a leaflet 60 mm. long. So it appears that away back in the middle of Tertiary time the *hirta*-group (*Rhus* of Greene, part

of *Schmaltzia* of Small) was perfectly differentiated. More than this, true *Schmaltzia* is also represented at Florissant; the species being *Schmaltzia vexans* (*Rhus vexans*, Lesq., *l. c.*, 195); and, says Lesquereux, this also scarcely differs from living forms. The fact that these groups were wholly separated so long ago, indicates that Greene is right in regarding them as different genera, and that Dr. Small should not be followed in uniting them under *Schmaltzia*. The Florissant flora also contains a *Cotinus*, namely *Cotinus fraterna* (*Rhus fraterna*, Lesq., *l. c.*, 192), closely allied to the *Cotinus Palaeocotinus* (*Rhus Palaeocotinus* Saporta) and *C. cotinus*, of Europe, the first being fossil, the other living.

When we consider the transformations undergone by the vertebrates since these venerable plants flourished, we cannot help feeling impressed with the permanence of types existing among not merely the lower plants, but the higher as well. It would seem that in estimating genera, such facts should count for something; and we should not be guided quite so much by the presence of conspicuous outward marks.

Boulder, Colorado.

PROCEEDINGS OF THE CLUB

November 29, 1905

This meeting was held at the New York Botanical Garden, with Vice-president Underwood in the chair. Twenty persons were present.

Dr. D. S. Martin exhibited specimens of glassy cinders formed by the burning of masses of rice-hulls near Charleston, South Carolina, illustrating in a striking manner the presence of silica in these hulls.

The announced paper of the afternoon was by Dr. N. L. Britton, under the title of "The North American Cactaceae." The speaker remarked that the Cactaceae of North America were being carefully studied by himself in coöperation with Dr. J. N. Rose, of Washington, in anticipation of preparing a systematic account of this group for the "North American Flora." The Mexican forms have been extensively collected by Dr. Rose and

are being kept under cultivation in Washington and New York. Numerous species from Arizona, New Mexico, Lower California and the West Indies have been secured by expeditions sent out by the New York Botanical Garden and now are under cultivation in New York. Herbarium material is, as a rule, peculiarly inadequate to a proper appreciation of the relationships of the members of this family and it is hoped soon to have all of the North American species under observation in the living state. Herbarium specimens are being supplemented by photographs and by material preserved in fluids.

The most recent of the more important papers on the classification of the Cactaceae is one by Berger, entitled "A Systematic Revision of the Genus *Cereus* Mill." and published in the Sixteenth Report of the Missouri Botanical Garden (1905). This paper has been based chiefly on the studies made in Sir Thomas Hanbury's famous gardens in Italy, and gives much importance to characters of flowers and fruit, characters which have been largely ignored in previous schemes of classification because unknown. The genus *Cereus* is divided into eighteen subgenera by Berger. The studies of the speaker and of Dr. Rose indicate that both in the old genus *Cereus* and in other groups of the cactus family, well-marked differential characters of flower and fruit are coördinated with those of the stem in such a way as to make the recognition of several new genera natural and convenient. After these introductory remarks, the meeting was adjourned to the propagating houses of the Garden, where numerous living specimens of Cactaceae were demonstrated and commented upon. Of the genus *Cereus* in the current sense, various types representing subgenera or possible generic segregates were discussed. Among these were *Cereus peruvianus*, the proper type of the genus *Cereus*; species of the *Pilocereus* group, with which the older *Cephalocereus* is historically identical; *Cereus Schottii* of Berger's subgenus *Lophocereus*; *Cereus geometrizans*, representing Console's genus *Myrtillocactus*; *Cereus Pringlei* of Berger's group *Pachycereus*; *Cereus sonorensis*, representing *Stenocereus*, also of Berger; *Cereus triangularis*, a species much cultivated in the West Indies and southern Florida,

with large, beautiful nocturnal flowers, a member of Berger's subgenus *Hylocereus; Cereus grandiflorus*, the best-known night-bloomer, belonging in Berger's subsection *Selenicereus;* the curious *Cereus Greggii* with slender stem and very large tuberous subterranean part, representing the subsection *Peniocereus* of Berger; the Central American *Cereus baxaniensis* of the group *Acanthocereus;* the Costa Rican *Cereus Gonzalezii*, of Berger's subgenus *Leptocereus;* and also representatives of Engelmann's subgenus *Echinocereus*. Other specimens were exhibited to illustrate the genera *Phyllocactus*, *Epiphyllum*, *Cactus*, *Echinocactus*, *Melocactus*, *Ariocarpus*, *Pelecyphora*, *Rhipsalis*, *Opuntia*, *Nopalea*, and the curious *Pereskia*, with its leafy, vine-like or shrubby stems.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

DECEMBER 12, 1905

This meeting was held at the American Museum of Natural History, with President Rusby in the chair. Thirty-four persons were present.

The following three persons were elected to active membership: Dr. Manuel Gomez de la Maza, Director del Jardin Botanico, Havana, Cuba; Mr. Henry Allan Gleason, 211 West 108th St., New York City; Mr. Stafford C. Edwards, New Brighton, Staten Island.

The announced paper of the evening was by Dr. Henry Kraemer and was entitled "Some Studies on Color in Plants and the artificial Coloring of Flowers." The subject of color in plants was considered first from a morphological and chemical point of view, and the speaker performed various illustrative chemical experiments involving changes of color in liquid media. The results of numerous experiments on the control of color in living plants and on the artificial coloring of cut flowers were given. Dr. Kraemer's paper will be published in full in the *Bulletin* of the Club. The following is his abstract of the more important results of his observations and experiments:

"1. Unorganized or cell-sap color substances are distributed

usually in largest amount at the termini of the branches, as in flowers and terminal leaves, or in roots, or in both tops and roots. Their occurrence in those portions of the plant, which are young and growing, points to the conclusion that they are not to be disregarded in the study of metabolic processes. Goebel holds a similar view. He says that it is 'very probable that the feature of color which so often appears when the propagative organs are being brought forth has some connection with definite metabolic processes, although till now we cannot recognize what these are.'

"2. The distribution of the so-called flower color substances in other parts of the plant than the flower also points to the same conclusion, and that the part which they play in attracting insects to flowers, is, if indeed they have any function of this kind, incidental rather than fundamental. The fact that certain colored flowers, as in the spruce and red maple of early spring, are pollinated by the wind, would tend to confirm this view. The food in the nectar and pollen are no doubt sufficient attraction for insects and other animals.

"3. The occurrence of chromoplastids in a reserve organ, as in the tuberous root of the carrot, and the similar occurrence of chromoplastids and of reserve starch in the petals of the buttercup, lead to the inference that the petal of the buttercup, like the root of the carrot, has the function of storing nutrient material. In each case cells containing chromoplasts rich in nitrogenous substances are associated with cells containing reserve materials. In the case of the carrot the reserve materials are utilized by the plant of the second year, and in the case of the buttercup they are utilized in the development of the akene.

"4. The feeding of plants with chemicals for the purpose of controlling color, as certain iron, aluminum, potassium and other salts as well as certain organic acids, has not so far, in the author's experiments with carnations, roses and violets produced any marked changes in the colors of the flowers, only some slight effects being noted which might be attributed to other causes. Knowing that plants have a certain individuality and certain inherent qualties or tendencies, other than negative results could hardly be expected. On the other hand, the plant

is a rather plastic organism, and for this reason experiments along the line indicated are more or less justified.

"5. Experiments in supplying plants and cut flowers with vegetable coloring matters and aniline dyes showed that none of the vegetable color substances were taken up and that only a comparatively few of the aniline dyes would color flowers. The fact that of thousands of dyes or color substances, only a few are carried as high as the flower, would tend to show that only certain chemicals or substances would be taken up by the plant, and thus exert an influence on the coloring matter in the flower. If such profound changes occur in plants as are provided by the mutation theory, is it too much to suppose that certain definite changes might be produced by means of which we have knowledge or control?"

Dr. Kraemer's remarks were illustrated by a hundred or more freshly cut flowers such as carnations, roses, hyacinths, and callas, which had been artificially colored in the few hours preceding the demonstration by placing the stalks of the flowers in solutions of certain dyes. Numerous dried specimens of artifically colored flowers of various plants were also exhibited.

Dr. Rusby showed fresh fruits of the so-called "tree-tomato," a species of *Cyphomandra* native to South America.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

NEWS ITEMS

Dr. George T. Moore will have charge of the botanical department of the Marine Biological Laboratory at Woods Hole, Massachusetts, during the coming summer.

It is stated in a recent number of *Science* that Professor Roland Thaxter, of Harvard University, has a year's leave of absence, during which he will make botanical collections in South America.

Professor J. C. Arthur and Mr. Frank D. Kern of Purdue University, Lafayette, Indiana, are spending three weeks or more at the New York Botanical Garden, engaged in studies on the North American Uredinales.

Dr. Jesse M. Greenman, assistant curator of the department of botany of the Field Columbian Museum, sailed from New York for Yucatan on January 11 to collect and study the phanerogamic flora of that region.

Dr. Burton E. Livingston, recently of the Bureau of Soils, U. S. Department of Agriculture, has accepted a position with the department of botanical research of the Carnegie Institution and began his new work on January 1.

Miss Alice A. Knox, for several months assistant in the laboratories of the New York Botanical Garden, becomes assistant in the department of botanical research of the Carnegie Institution on February 1, remaining in residence at the Botanical Garden.

The *Bryologist*, with the January issue, at the beginning of its ninth volume, passes under the editorship of Mrs. Annie Morrill Smith, who is assisted by Dr. A. J. Grout (mosses), Mr. G. K. Merrill (lichens), and Miss Caroline Coventry Haynes (hepatics).

Sir William Thiselton-Dyer has resigned the directorship of the Royal Botanic Gardens at Kew, a positition which he had held since 1885. His successor is Lieutenant-Colonel David Prain, who has been director of the Botanical Survey of India since 1898.

Professor P. H. Rolfs, now in charge of the subtropical laboratory of the U. S. Department of Agriculture at Miami, Florida, has been elected director and horticulturist of the Florida Agricultural Experiment Station at Lake City and will take up his new duties on February 1. Mr. Ernst A. Bessey is Professor Rolfs' successor at Miami.

At the meeting of the American Mycological Society held in New Orleans January 1, Vice-president F. S. Earle occupied the chair in the absence of President Charles H. Peck. Twelve papers were presented. The president, vice-president, and secretary-treasurer (C. L. Shear) were continued in office as a committee to complete details of organization in connection with the proposed union with other botanical societies.

Dr. F. Börgesen, of the Botanical Museum of Copenhagen, reached St. Thomas, West Indies, about the middle of December

for his third botanical exploration of the Danish West Indian islands. He is giving special attention to the collection of marine algæ with the assistance of Danish men-of-war for dredging operations. Dr. Börgesen hopes to visit the United States on his return voyage in April.

New appointments and changes of title in the staff of the New York Botanical Garden for the year 1906 include the following, the appointments dating from January 1, unless otherwise indicated: First assistant, William A. Murrill; head curator of the museums and herbarium, John K. Small; curator of the museum, P. A. Rydberg, Arthur Hollick, Marshall A. Howe; director of the laboratories, C. Stuart Gager (February 1); assistant curator, R. S. Williams, C. B. Robinson (July 1); administrative assistant, Percy Wilson.

The Bureau of Government Laboratories at Manila has been combined with the Mining Bureau of the Philippine Government and the united institutions are now to be known as the Bureau of Science. The results of its researches will be published in a new journal to be called "The Philippine Journal of Science." Dr. E. B. Copeland and Mr. A. D. E. Elmer have been transferred from the Bureau of Science to the educational department and Dr. H. N. Whitford goes to the Forestry Bureau.

Julien Reverchon, professor of botany in the Baylor College of Medicine and Pharmacy, Dallas, Texas, and well known as a student and collector of Texan plants, died near Dallas on December 30, 1905. He was born near Lyons, France, August 3, 1834, coming to America and settling in Texas in 1855. He was a correspondent of Gray, Engelmann, Sereno Watson, and many later American botanists, and had contributed papers to the *Botanical Gazette*, *Garden and Forest*, and the *Fern Bulletin*. He is said to have left a collection of over 20,000 specimens of Texan plants.

The American Association for the Advancement of Science held its fifty-fifth annual meeting in New Orleans, December, 29, 1905, to January 4, 1906. The address of Professor W. G. Farlow, the retiring president of the Association was entitled

"The Popular Conception of the Scientific Man at the Present Day." This address was published in full in *Science* for January 5. Papers represented by thirteen titles were offered before Section G (botany) in addition to those read in joint session with the American Mycological Society. In the absence of Dr. Erwin F. Smith, the chair was occupied by the retiring chairman, Professor B. L. Robinson, whose vice-presidential address was upon "The Generic Concept in the Classification of the Flowering Plants." For 1906, Dr. D. T. MacDougal was elected chairman of Section G, Professor F. E. Lloyd continuing to serve as secretary.

The Botanical Society of America held its twelfth annual meeting at New Orleans, January 1–4, 1906. Vice-president E. A. Burt acted as chairman in absence of President R. A. Harper. Past-president Frederick V. Coville was absent and his announced address on "Botanical Explorations in Alaska" was accordingly omitted. For the ensuing year, Professor F. S. Earle was elected president; Professor William Trelease, secretary; and Dr. Arthur Hollick, treasurer. Grants were approved as follows: $200 to Professor E. C. Jeffrey to aid in collecting lignitic fossils of eastern North America and in investigating their internal structure; $150 to Dr. C. J. Chamberlain for the continuation of his studies on the spermatogenesis, oögenesis, and fertilization of *Dioön* and *Ceratozamia;* and $100 to Professor J. C. Arthur for the continuation of investigations on the North American Uredinales.

The Society for Plant Morphology and Physiology held its ninth annual meeting at the University of Michigan, Ann Arbor, Mich., along with the affiliated scientific societies, on December 27–29, 1905. Twelve papers were presented in full. The meeting was practically a joint one with the Association of Central Botanists, the latter association having the afternoon, and the former the morning, programs. The Society voted to adopt the plan for the union of the American botanical societies and to unite with the Botanical Society of America and the American Mycological Society in case the proposed plan of union should be approved by those organizations. In view of the possible union no new officers were chosen, but the officers of last year were re-

elected to serve until the union is effected or until the next annual meeting. These officers are president, Professor E. C. Jeffrey; vice-president, Dr. C. O. Townsend; secretary-treasurer, Professor W. F. Ganong.

Mr. Job Bicknell Ellis, for years one of the leading systematic mycologists of America, died in Newfield, New Jersey, on December 30, 1905. He was born in Potsdam, New York, January 21, 1829. An interesting biographical sketch of Mr. Ellis, written by Mr. F. W. Anderson, was published in the *Botanical Gazette* for November, 1890. From 1880 until death severed the partnership in September, 1904, he was associated with Benjamin M. Everhart in the publication of descriptions of new American fungi and in issuing widely known sets of exsiccati of American fungi under the titles "North American Fungi" and "Fungi Columbiani," though the practical direction of the latter series has been assumed in recent years by younger workers in the mycologic field. Mr. Ellis' personal herbarium, including the types of numerous species, was purchased several years ago by the New York Botanical Garden and a large part of his library is also in possession of the same institution.

The Vermont Botanical Club held its eleventh annual winter meeting at the University of Vermont, Burlington, January 17 and 18. Among the papers read were those by President Ezra Brainerd treating of variations in violets, by C. G. Pringle in a reminiscent vein, by W. W. Eggleston on the Crataegus problems, and by Miss Nancy Darling on the flora of Hartland, Vt. In the latter was reported the finding of *Dryopteris Filix-mas*, which is a noteworthy addition to the flora not only of Vermont but of New England as well. The next field meeting is to be held about July 1 on Mt. Mansfield, when it is hoped a number of visiting botanists from other New England States and New York may meet with the local members. It is decided to publish an annual bulletin, of which the first number may be expected next April. The officers elected are: President, Ezra Brainerd; vice-president, C. G. Pringle; treasurer, Mrs. N. F. Flynn; secretary, L. R. Jones.

Vol. 6 No. 2

TORREYA

February, 1906

THE EFFECTS OF HIGH RELATIVE HUMIDITY ON PLANTS

By W. A. Cannon

The water relations of the desert plants are so delicately adjusted that an apparently slight variation in the available supply, either an increase or a decrease, or, what is directly associated with the water relations, in the humidity of the air, produces an instant and notable effect. This is not new, as a matter of fact, but new instances of it may be worth recording. I have already shown * how readily the ocotillo (*Fouquieria splendens*) responds to an increase in the water supply. Up to June 29, 1904, for several weeks the particular ocotillo referred to above was without leaves. This condition was directly connected with a long period of drought. On June 29, three gallons of water were poured slowly on the ground at the base of the plant; on July 1, leaf-buds were seen, which at 2 P. M. on the following day had become 1 cm. long, and four days afterwards the leaves were fully grown. But owing to the continuation of the drought, and the small amount of moisture in the air the leaves thus artificially produced very early withered and fell away and after about a fortnight the shrub was again denuded. The response of ocotillo to an increase in the water supply was observed on other occasions which are narrated in the paper above cited. Similar reactions have been seen in *Encelia farinosa*, *Cereus giganteus*, *Parkinsonia microphylla* and in other plants.

From what has already been said, it is apparent that a want or a supply of sufficient rain must materially modify the activities of the desert plants. For example, in the summer of 1904 the rainfall was nearly normal and the desert abounded in a pro-

* Transpiration of *Fouquieria splendens*. Bull. Torrey Club 32 : 411. 1905.

[No. 1, Vol. 6, of Torreya, comprising pages 1–20, was issued January 25, 1906.]

fusion of annuals, and the shrubs and trees, also, were covered with foliage and renewed their growth with great vigor. But in the present year (1905), the rainfall of summer was scant and the desert has quite another appearance. The annuals are wholly wanting and the manifestations of vegetative activity on the part of the longer-lived plants are very meager. Certain of the shrubs and the trees, however, show that the conditions obtaining this year are far removed from those of a drought. It is in fact to these conditions and to their apparent influence on the plants that I wish by this note to direct attention.

The rainfall and the relative humidity data for the summers of 1904 and 1905 show that the relative humidity for the two seasons was approximately the same but that the rainfall was very unlike. In fine, not one half the normal rainfall was recorded during the summer of 1905. The peculiar condition of a small rainfall accompanied by high relative humidity is accounted for by the occurrence of rains in plenty in all of the country adjacent to Tucson. The climate of the summer of 1905 was therefore not only different from that of the preceding summer but was so striking as to merit attention.

So long as the annuals failed to appear, as has been mentioned in an earlier paragraph, it naturally happened that the only plants which exhibited the effects of the summer's climate were those with a variable transpiring surface, that is, plants which increase their transpiring surface and decrease it in accordance with the fluctuation of the available water. Under the usual atmospheric conditions obtaining during a rainless period such plants would be leafless, or at least nearly so. As an example of these, *Parkinsonia microphylla*, the "palo verde" of the Mexicans, and *Fouquieria splendens*, the "ocotillo," may be selected. How did these forms respond to the anomalous climate of summer?

Palo verde is so called not only because it is a green tree from its foliage like other trees but chiefly because it is green even when the leaves have fallen. The twigs, branches and stem are green and all perhaps capable of emitting watery vapor from their surface and capable of carbon assimilation. Besides this, the leaves are so small (they average about 14.3 leaflets per

square centimeter) that their absence does not materially alter the usual appearance of the tree. Experiments on the transpiration of palo verde, not yet published, have shown that as compared with other desert forms, notably ocotillo, it has a low rate of transpiration, and that the possible range of transpiration is likewise small. That is, the "maximum" rate in summer when the leaves are on is not so much greater than the "minimum" when the leaves have fallen, as is the case with such other desert plants as have been studied. The foliar history of the palo verde is in complete accord with this observation. The tree forms leaves slowly and retains them a relatively long time. However, in cases of severe drought the leaves are shed and the necessary adjustment of the rate of transpiration is accomplished.

By the time of the summer rains in 1904 the leaves had fallen from the palo verdes near the Laboratory; after the rains had come leaves were again organized. This course of events, which may perhaps be the usual one, was not followed this season. Possibly owing to the extraordinarily heavy spring rains, and in part to small rains in June, the leaves were carried through the dry portion of the earlier part of July until the time for the summer rains had come, and then, despite the fact that the rainfall of summer was a meager one, they still persisted. With little doubt the reduced amount of rain of the summer would not under ordinary conditions of the atmospheric moisture be sufficient to permit the retention of the leaves. That they were retained is in the main due, I believe, to the high humidity which prevailed at the time.

A more striking example of the influence of high relative humidity in extending the life of leaves is found in the ocotillo. As was stated in an earlier paragraph the ocotillo when leafless responds to an improvement in its water conditions by quickly putting on a leaf-covering, and when dry weather returns this is nearly as quickly exfoliated. It is of interest to note also that this plant has a very high "maximum" rate and a very low "minimum" rate, and, therefore, that the possible seasonal variation is considerably greater than that of palo verde, for instance. The ocotillo then usually drops its leaves during a moderately

severe drought and reforms them promptly when even a slight rain falls. During the present season the history of the leaf-covering was quite different. In the earlier portion of June these plants were leafless, but owing to the occurrence of a small rain about the middle of the month, they came into leaf and were able to retain their leaves until the beginning of the summer rains. The leaves which were formed in June, as well as those formed later in the summer, remained on the shrubs during July, August, and are still (September 22) to be seen although now they are yellowing and preparing to fall.

The rainfall of the summer was not sufficient, I believe, to account for this behavior of the leaves of ocotillo since the ground was very dry, as indicated among other things by the failure of many seeds which were planted August 4 to germinate, and had the humidity been low in correspondence with the rainfall the leaves with little doubt would long ago have fallen. In whatever manner accomplished, it appears to have been mainly, or wholly, the high relative humidity which so changed the life conditions that the ocotillo, like palo verde, was able to retain its leaves during three months of the hot summer weather.

It is beyond the purpose of this note to discuss the means by which these desert plants were able to keep their leaves through so long a period of apparently unfavorable conditions. But it seems on the surface that aside from the fact that a large amount of moisture in the air would retard the rate of transpiration and thus assist the plant in better conserving the amount of water at its disposal, it is conceivable that the leaves of the plants really absorb atmospheric moisture in sufficient amounts to be of biological importance. This remains to be tested. I have shown, in the paper cited above, that stems of ocotillo absorb both water and atmospheric moisture, and Prof. F. E. Lloyd, who kindly permits me to make the announcement in advance of its publication,* has determined that a branch which is without leaves can absorb water in sufficient amount to induce leaf-formation. It will be of much interest, therefore, to learn whether the stems and the leaves of ocotillo especially can absorb moisture from

* See Torreya 5 : 175.

the atmosphere in large enough quantity to enable it under such conditions as obtained the past summer to retain its leaves and thus to prolong the period of its vegetative activity.

DESERT BOTANICAL LABORATORY,
TUCSON, ARIZONA.

SYNCARPY IN MARTYNIA LUTEA

BY J. ARTHUR HARRIS

The fruit of *Martynia* is a strongly curved, beaked, loculicidally two-valved capsule in which the somewhat fleshy exocarp falls away in two parts and exposes the variously armed fibrous woody endocarp, which dehisces from the tip of the strongly curved back towards the base. On the median line of the upper and lower carpels or only on that of the upper carpel is produced a prominent crest. In *M. lutea* only the upper carpel is crested.* Internally the capsule is five-celled through the expansion of each of the parietal placentae into two laminae which extend to the wall, thus forming four lateral cells and one large central cell into all of which the seeds extend from the margins of the laminar placentae.

In *M. lutea* growing on the grounds of the Missouri Botanical Garden I found the two cases of syncarpy which are figured here. Externally, they are identical in form while the internal structure is clearly seen from the figure of the cross-section of one of the fruits. The two specimens were found late in the fall after the disappearance of the exocarp so that any evidence offered by that part of the fruit is not available.

The relatively greater size of the abnormal fruit is shown by the cross-sections given. The relation of the elements of the fruit to the peduncle is worthy of notice. In the normal fruit the

* Here I use upper and lower in the popular instead of in the strict morphological sense of dorsal and ventral. Britton and Brown in their Illustrated Flora evidently do the same. They say of *Martynia*: "the endocarp * * * crested below or also above," and of *M. Louisiana* Mill. (= *M. proboscidea* Glox.): "the endocarp crested on the under side only." The figure given represents the fruit in an inverted position, the horns turning downward instead of upward, so that the statement appears to be an oversight due to lack of familiarity with the habit of the plant.

crest lies approximately in the plane of the peduncle, while in the fruits here under consideration this plane passes approximately between the two crests of the double fruit, through two of the four parietal placentae, as indicated by the dotted line.

The armature is similar to that of the normal fruits. In both of the examples observed, the crests lie to either side of the uppermost section and the plane of the peduncle.

The determination of the morphological relationships of the parts of the fruit is not easy or finally satisfactory with only mature material available, but the following suggestions seem helpful.

The position of the four parts of the beak can offer little evidence of value owing to the ease with which their form might be modified. The inner flattened surface of the upper and lower are approximately opposed to each other and the same is true of the lateral elements of the four-parted beak.

Internally, the anomalous capsules show four parietal placentae, each expanded into two laminae upon the edges of which the seeds are borne, very similar to those of the normal fruit. The cavities are poorly defined since the ovule-bearing edges do not reach the walls.

Each of the claws (half of the beak of the fruit) of the ripe and opened normal fruits represents not the distal prolongation of a single carpel but the edges of both carpels, as is very clearly seen from a section or from the conspicuous grooves marking on the dry fruit the position of the placentae. This is also true of the double fruits.

On the peduncle the flowers are arranged spirally, so that if we conceive of the abnormal fruit as formed from the primordia of two successive flowers it will be seen that the synanthy will be in part dorsal and in part lateral. This may explain the relation of the parts of the fruit to the peduncle, as described above, and the position of the crests on either side of the uppermost of the four sections of the fruit. The accompanying diagram may make clear a hypothesis as to the composition of the fruit. In this diagram the walls of the two component fruits are indicated by the difference in shading. The position of the crested outer

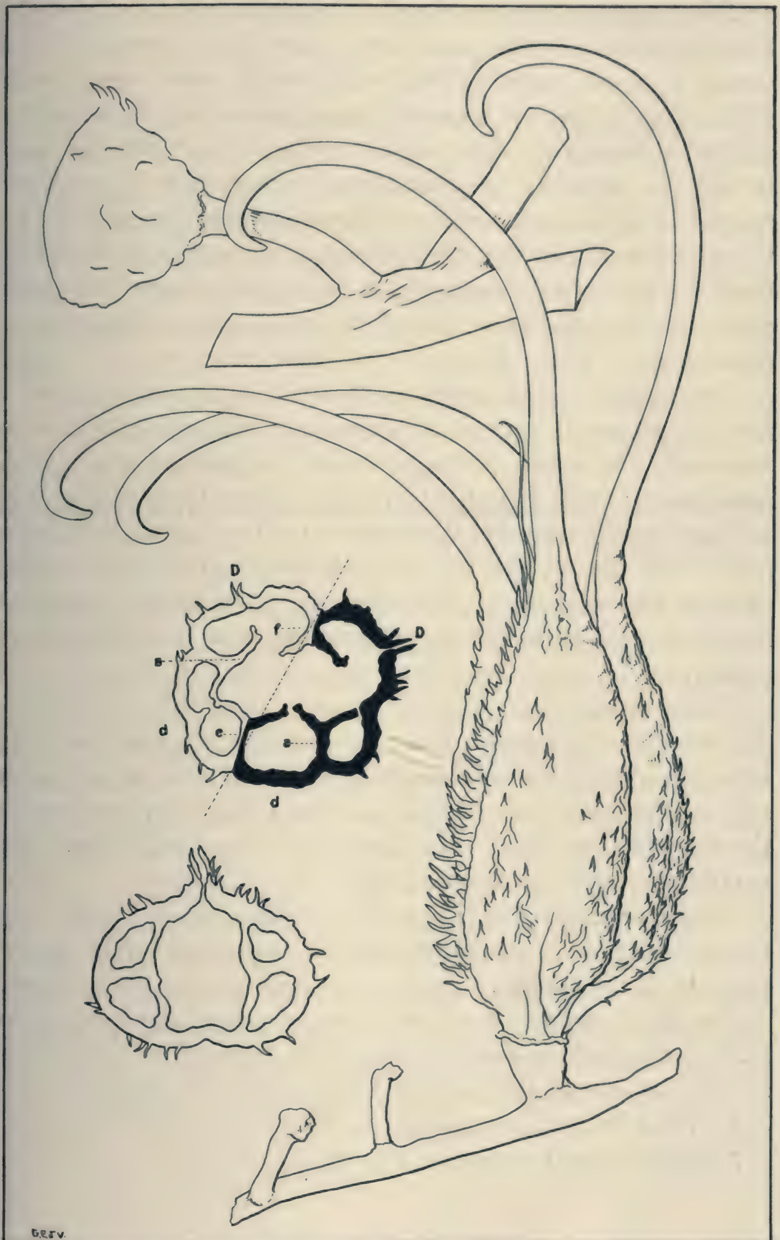


FIG. I. Syncarpy in *Martynia lutea*.

or dorsal suture of the two carpels is very easily and surely established at *D*, *D*. In the normal fruit a smooth or uncrested dorsal suture must be sought beyond a placenta to either side of this. In the normal fruit the uncrested dorsal suture is represented by a smooth furrow, the only *smooth* furrow on the fruit, the position of the placentae being indicated externally by a groove of about the same rough nature as the remainder of the surface. In the monstrous fruits smooth furrows are found at *d*, *d*, and since these are the only positions which fulfil the condition mentioned above for the uncrested outer or dorsal suture, their nature seems clear. In the fruit, then, two placentae, *a* and *B*, represent the edge of carpels of a single fruit, while the other two, *e* and *f*, represent the edges of carpels from the two fruits; in the same way, the upper and the lower of the four horns are each composed of parts from the two joining fruits, while the two lateral horns each represent the edges of the two carpels of a single fruit. It is evident that if this assumption be true, some of the parts of the fruit have a quite different proportional development from what they do in the normal fruit, but this is not at all surprising.

While, as stated above, the evidence of young material is very desirable, the explanation here given is the only one I am able to suggest which will explain the observed sutures as a case of syncarpy in which the coalescence of the carpellary elements of the two fruits has taken place along the edges which form the ventral sutures in the normal fruit.

The flowers are usually borne in a raceme, but it occasionally happens that one is produced from the main stem a little below the base of the raceme. Such a case is illustrated in the figure.

The figure represents a lateral view of one of the syncarpous fruits, both of which were approximately identical in form, cross-sections of normal and abnormal fruits, and the anomalous insertion of a fruit on the main stem below the pedicel.

Missouri Botanical Garden.

NOTES ON WEST INDIAN CRUCIFERAE

By N. L. Britton

Mr. O. E. Schultz has contributed an account of the crucifers known to him to occur in the West Indies to Professor Urban's "Symbolae Antillanae" (**3** : 493–523), in which he describes 23 species included in 11 genera. All but four of the species recognized are natives of the Old World, introduced into the islands as waifs or weeds. The indigenous species are :

1. Cakile lanceolata (Willd.) O. E. Schultz, *loc. cit.* 505. 1903.

Raphanus lanceolatus Willd. Sp. Pl. **3** : 562. 1801.

Cakile domingensis Tuss. Fl. Ant. **1** : 119. 1808.

Cakile aequalis L'Hér.; DC. Syst. **2** : 430. 1821.

Cakile cubensis H.B.K. Nov. Gen. & Sp. **5** : 58. 1821.

Cakile lanceolata subsp. *domingensis* O. E. Schultz, *loc. cit.* 1903. Type locality : Antilles.

This occurs on sandy beaches and is reported by Schultz from Colombia and St. Vincent northward to the Bahamas and Florida. It grows also on the Bermudas, as recorded long ago by Hemsley in the Botany of the Challenger Expedition, but overlooked by Schultz. That this plant is specifically distinct from the northern Atlantic coast *C. edentula* (Bigel.) Hook., which Schultz refers to it as a subspecies, is evident at least to any one who has seen both species living. The status of *C. geniculata* (Robinson) Millsp. in Publ. Field Columb. Mus. Bot. Ser. **2** : 126, and of *C. alacranensis* Millsp. *loc. cit.* 130, both of which he refers to *C. lanceolata* as proles or varieties, can be established only by the examination of more specimens than are now available. Indeed, the attempt of Mr. Schultz to classify the plants of this genus into named forms and varieties of various ranks serves no useful purpose whatever, and does not express their real relationships at all ; the only advance that he has made in their study is to point out an older name for the species long known as *C. aequalis* L'Hér.

2. **Radicula*** **glabra** (O. E. Schultz)

Nasturtium palustre subsp. *hispidum* var. *glabrum* O. E. Schultz, *loc. cit.* 516. 1903.

This is a robust plant, often 6 dm. tall, with large, deeply pinnatifid leaves, quite glabrous, except for a few long hairs at the margins of the petiole-bases; the silicles are ovoid-globose, only a trifle longer than thick, 2–2.5 mm. in diameter, but the septum elongates and narrows as the valves and seeds fall away, becoming 4–5 mm. long. Its relationship is with *R. hispida* of continental North America, reported also by Schultz from Haïti. *Radicula glabra* is well illustrated by Curtiss' no. 672 from Bejucal, Cuba; Mr. Schultz based the name upon Wright's no. 1862 from Cuba, and I know the species only from these two collections. It appears to me quite as different from either *R. palustris* (L.) Moench or *R. hispida* (Desv.) Britton as the following species is from the Floridian *R. Walteri* (Ell.) Greene.

3. **Radicula brevipes** (DC.)

Nasturtium palustre var. *brevipes* DC. Syst. **2**: 192. 1821.

Nasturtium brevipes Griseb. Mem. Amer. Acad. **8**: 154. 1860.

Nasturtium tanacetifolium var. *insularum* Robinson in A. Gray, Syn. Fl. N. A. **1**[1]: 149. 1895.

Moist or wet situations, Cuba, Santo Domingo, Porto Rico.

Mr. Schultz proposes a variety *pumilum* of this species, citing as type Wright's no. 1562 from Cuba; our specimen of that number seems to be merely a depauperate state of the species.

4. Cardamine pennsylvanica Muhl.; Willd. Sp. Pl. 3: 486. 1801

Schultz records this from Haïti, on the evidence of specimens collected by Poiteau, preserved in the Ventenat and Delessert herbaria. Our collectors have not found it on that island. He ranks it as a subspecies of the European *C. flexuosa* Withering, but I regard these species as quite distinct.

As to the introduced species, I record the following data of distribution additional to those cited by Schultz:

* Radicula (Dillen) Hill, Brit. Herb. 264. 1756. *Roripa* Scop. 1760.

LEPIDIUM VIRGINICUM L. Common in Bermuda. Mr. Schultz could not have consulted the Kew herbarium for Bermuda specimens.

CORONOPUS DIDYMUS (L.) J. E. Smith. This he cites from Bermuda, collected by Rein, but not from the Bahamas, where it occurs on the island of New Providence (*Earle 34; Britton & Brace 790*); it has also been found at Cinchona, Jamaica (*Harris 8579*); Schultz cites it from Jamaica on the old authority of MacFadyen.

SISYMBRIUM OFFICINALE (L.) Scop. This he also cites from Jamaica on the authority of MacFadyen, but from nowhere else in the West Indies. It is a common weed in Bermuda, duly recorded by Hemsley, whose authority is quite as good as MacFadyen's, and by others. He proposes a variety *leiocarpum* from Haïti, characterized only by glabrous siliques; the Bermuda plant as represented by *Brown & Britton 343* has these also, and if he had looked through a good series of specimens from eastern North America he would have found glabrous siliques on a large percentage of them.

The following naturalized species of Bermuda, observed and collected by Mr. Stewardson Brown and myself last September, are not recorded at all from the West Indies by Mr. Schultz; all were previously reported by Hemsley.

MATTHIOLA INCANA (L.) R. Br. On seaside cliffs, Port Royal and elsewhere (*Brown & Britton 349*).

BRASSICA NIGRA (L.) Koch. Cultivated land, very common in Bermuda (*Brown & Britton 371*).

KONIGA MARITIMA (L.) R. Br. Roadside near Warwick Camp (*Brown & Britton 353*).

Mr. Hemsley also records the following from Bermuda; they were not seen there during our visit in September, 1905, but may very well be in evidence earlier in the year:

LEPIDIUM RUDERALE L.

RAPHANUS RAPHANISTRUM L.

It is to be hoped that the next time Mr. Schultz takes up a West Indian family for study, he will give us results which will be more complete and satisfactory than those of this excursion

into the Cruciferae, and that he will not take amiss the suggestion to consult as conspicuous a book as the Botany of the Challenger Expedition.

TERATOLOGICAL NOTES

By S. B. Parish

1. *Retrogression of Pistil and Sepalody in Gentiana viridula.* — This is a small annual species of the *Chondrophylla* group, with solitary terminal flowers, inconspicuous and green in color, except for the scanty blue plaits in the sinuses. They are seen in the figure at the ends of the three short stems. Those which appear on the two long stems have undergone a remarkable metamorphosis. The corolla has lost its form and become calyx-like, with a margin merely toothed. The anthers retain their position, as is shown in the detail figure, where the sepaloid corolla is represented as laid open. The pistil is transformed into an elongated tube, having an enlarged, bilabiate summit.

There were a number of specimens, all showing the same malformations. They were collected in the San Bernardino Mts., by Mrs. Charlotte M. Wilder, to whom I am indebted also for the accompanying drawing.

2. *Suppression of Floral Cycles in Prunus.* — In an orchard there is a row of plum trees of the variety known as the "Wild Goose." All of them produce regular crops, except one, which has never borne a single fruit. An examination during the flowering season revealed the cause of its barrenness. Normally the flowers of this plum are borne on inch-long pedicels, in clusters of five or six. In the case of the tree in question the pedicel, the calyx, the corolla, the gynoecium, all were wanting.

There remained only a sessile cluster of about twelve antheriferous stamens, arising directly from the bud-scales. The tree was abundantly loaded with these imperfect flowers. Nurserymen usually bud their stock from bearing trees, so that we probably have here a case of bud-variation. Naturally it would have been confined to the single bud, but this happening to have been taken for propagation, has produced its like in an entire tree.

3. *Antholysis and Phyllody in Digitalis purpurea.* — A garden fox-glove had the campanulate corolla divided almost to the base into three or four irregular segments. The stamens were regular, but the stigma lobes of the pistils had reverted to a whorl of small green leaves.

4. *Sepalody in Lophanthus urticifolius.* — In a specimen of this herb, collected in the San Bernardino Mts., all the flowers exhibit a retrogression of the corolla to a second or inner calyx. This pseudocalyx differs from the true one only in the teeth, which are very shortly acute, and are placed alternately with the subulate teeth of the calyx proper. The reversion of the corolla was accompanied by a suppression of the androecium. The gynoecium was regular, except that the ovaries were infertile.

5. *Compounding of the Spike in Plantago lanceolata.* — The normal infloresence of this plantain is a simple cylindrical spike. Specimens collected in Amador County, by Mr. Ernest Braunton, have this broken up into 20–30 spikelets, growing from the axis of the normal spike, and conglomerated into an irregular globose head, an inch in diameter.

6. *Fasciation in some Cylindropuntiae.* — Fasciation is one of the commonest of monstrosities. It probably occurs in most, if not all of the round stemmed Opuntias. I have observed it in *O. bernardina*, *O. echinocarpa* and

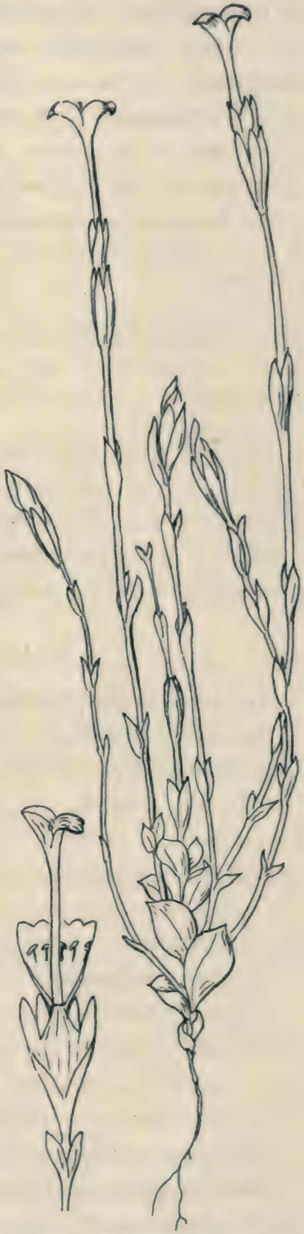


FIG. 2. Retrogression of Pistil and Sepalody in *Gentiana viridula*.

O. ramosissima. It results in the production of flat, cockscomb-like joints, which are similarly proliferous, never, so far as I have seen, reverting to the cylindrical shape. Such forms are greatly esteemed by cactus fanciers, who propagate them under the name of "cristate varieties." They have similar fasciated specimens of the cactus-like cylindrical Euphorbias.

San Bernardino, California.

THE PILEATE POLYPORACEAE OF CENTRAL MAINE

By William A. Murrill

The following list of pileate polypores is compiled from the records of my collections in Maine during August and September, 1905. The specimens are at the New York Botanical Garden. A list of stations and their corresponding collection numbers follows the list of fungi:

Subfamily Polyporeae

Antrodia mollis (Sommerf.) Karst. *2009.*

Bjerkandera adusta (Willd.) Karst. *1900, 2182.* Common.

Bjerkandera fumosa (Pers.) Karst. *1790.*

Coltricia perennis (L.) Murr. *1997, 2179, 2283, 2389.* Common.

Coriolus abietinus (Dicks.) Quél. *2672, 2673, 2674.* Common.

Coriolus nigromarginatus (Schw.) Murr. *2280.* Common on deciduous wood. This specimen grew on a white-cedar stump.

Coriolus pargamenus (Fr.) Pat. *1780, 1899, 2181.* Common.

Coriolus planellus Murr. *1906, 2187.*

Coriolus pubescens (Schum.) Murr. *1902, 2173, 2174, 2282, 2536, 2670.* Common.

Coriolus versicolor (L.) Quél. *1910, 2180, 2186.* Common.

Hexagona alveolaris (DC.) Murr. *2528.* Common.

Inonotus perplexus (Peck) Murr. *1901.*

Inonotus radiatus (Sowerby) Karst. *1917, 2534.*

Irpiciporus Tulipiferae (Schw.) Murr. *1750.* Common.

Ischnoderma fuliginosum (Scop.) Murr. *2527, 2677.* The latter collection is a fine specimen on dead hemlock.

Phaeolus sistotremoides (Alb. & Schw.) Murr. *1792.* Common.

Polyporus elegans (Bull.) Fr. *1993, 1994.* Common.

Polyporus fagicola sp. nov.

Pileus orbicular, convex to plane, umbilicate, 4–5 cm. × 0.1–0.3 cm.; surface smooth, pale-avellaneous, ornamented with tufts of innate fibrils, which are larger and darker nearer the center and somewhat radiately and imbricately arranged; margin very sharp, slightly decurved, regular in outline, not ciliate: context thin, fibrous, white; tubes milk-white, decurrent, favoloid, 1–2 to a mm., edges very thin, fimbriatulate: spores ellipsoid, smooth, hyaline, $3–4\,\mu \times 6–7\,\mu$: stipe central, solid, thick, nearly equal, concolorous, conspicuously hispid, especially near the base, 2 cm. long, 1 cm. thick.

2539 (type). This plant was found on the top of a fallen decorticated beech log, in heavy mixed woods on the slope of Boarstone Mountain, Piscataquis Co., September 14, 1905. It has the habit of *Polyporus Polyporus.*

Polyporus fissus Berk. *1784, 2178, 2530, 2669, 2675.* The last specimens were collected on a dead balsam-fir log.

Polyporus Polyporus (Retz) Murr. *2175, 2176, 2177.*

Poronidulus conchifer (Schw.) Murr. *1782, 1998.* Common on white elm.

Pycnoporus cinnabarinus (Jacq.) Karst. *1896.*

Spongipellis borealis (Fr.) Pat. *2676.* This grew on balsam fir.

Spongipellis galactinus (Berk.) Pat. *2014.* Seen only once, but then in great abundance, covering the inside of a large white-elm stump.

Tyromyces. [See a later article in the Bulletin of the Torrey Botanical Club.]

Subfamily Fomiteae

Elfvingia fomentaria (L.) Murr. *1903, 1793.* Common.

Elfvingia megaloma (Lév.) Murr. *1800.* Common.

Fomes populinus (Schum.) Cooke. *1742, 1905, 1999, 2526.* All on red maple.

Fomes roseus (Alb. & Schw.) Cooke. *1797, 2386, 2532, 2533.* Common.

Fomes scutellatus (Schw.) Cooke. *1751, 1904, 2183.* Common on alder.

Fomes ungulatus (Schaeff.) Sacc. *1789, 2387, 2535.* Common on conifers. The last two collections were on sugar maple and birch respectively.

Ganoderma Tsugae Murr. *2529.* Common on hemlock.

Porodaedalea Pini (Thore) Murr. *2538.* This is the thin form on spruce.

Pyropolyporus igniarius (L.) Murr. *1791, 1911.* On white elm and red maple.

Pyropolyporus igniarius nigricans (Fr.) Murr. *1743.* Common on birch.

Subfamily Agariceae

Agaricus confragosus (Bolt.) Murr. *1781.*

Cerrena unicolor (Bull.) Murr. *1778, 1909, 1995, 2184, 2281, 2531.* Common.

Gloeophyllum hirsutum (Schaeff.) Murr. *1788, 1992, 2185.* Common.

Lenzites betulina (L.) Fr. *1779, 2279.* Common on deciduous wood. The latter collection was made on a white-cedar stump.

List of Camps with corresponding Collection Numbers

Number of camp	Location of camp	Collection numbers
1.	Near Costigan, Penobscot Co.	1742–1768
3.	Near Passadumkeag, Penobscot Co.	1769–1827
5.	Medford township, Piscataquis Co.	1829–1927
6.	At the mouth of Pleasant River, Piscataquis Co.	1928–2004
7.	Below Milo, Piscataquis Co.	2005–2010
8.	A mile above Milo, Piscataquis Co.	2015–2213
9.	West of Sebec Village, Piscataquis Co.	2214–2290
10.	A mile west of Greely's Landing, Piscataquis Co.	2291–2401
11.	Willimantic, Piscataquis Co.	2012–2014
12.	Boarstone Mountain, Piscataquis Co.	2402–2551

13. Head of Sebec Lake, Piscataquis Co. 2552–2677

No. 1828 was collected at camp 4, near Maxfield, and no. 2011 at Howland.

New York Botanical Garden.

REVIEWS

Keller and Brown's Flora of Philadelphia*

This handbook, based chiefly upon data patiently gathered during many years by the members of the Philadelphia Botanical Club and their friends, should provide a marked stimulus to further study of the flora of the district of which Philadelphia is the center. The species enumerated are not described, but a full system of keys permits fairly accurate determinations in the field without the use of a more cumbrous text-book, while in each case there is a reference to the page of Britton's Manual where a description may be found. Recent work upon *Crataegus* has compelled special treatment of this genus, and the key to the eighty-five species has been prepared by Mr. B. H. Smith.

In general plan this volume resembles strikingly Porter's Flora of Pennsylvania, published about two years ago ; it includes within its scope, however, the plants of the southeastern portion only of Pennsylvania, and in addition those of northern Delaware and of the southern two-thirds of New Jersey. The two books are worthy models for future ones of their class. There is nothing relating to geographical distribution nor to ecological conditions within the region, but an omission of this kind causes no regret in the case of a work with such an artificial geographical limit and such a definite purpose as a field manual.

The thin paper used is so transparent as to interfere with the clearness of the text. However, lightness and compactness are of importance in a flora intended for use in the field, and in this instance a book of 368 octavo pages has been reduced to half an inch in thickness and a pound in weight. Typographical errors seem to be fewer than might reasonably be expected.

* Keller, Ida A., and Brown, Stewardson. Handbook of the Flora of Philadelphia and Vicinity. Pp. viii + 360. Philadelphia, 1905. (For sale by Stewardson Brown, Acad. of Natural Sciences, Logan Square, Philadelphia. $2.00 net ; by mail, $2.10.)

By the appearance of this volume, the botanists of Philadelphia are provided with a pocket companion for their journeys afield more satisfactory than any available for other parts of our country. There is little room, apparently, for improvement in later editions, save in the insertion of newly acquired data and the addition of a good map of the region.

JOHN HENDLEY BARNHART.

Lord Avebury's Notes on the Life History of British Flowering Plants*

This work is not intended to be in any sense a manual for the determination of the species inhabiting the British Isles, but instead, taking up the flora in Bentham's sequence and in general with his specific limitations, it furnishes descriptions of the various plants in such a way as to emphasize the points in their structure which bear most directly upon the peculiar problems presented by their life conditions.

The spirit of the author is perhaps best indicated by the conclusion to the introduction in which he says: "To many, indeed, systematic botany is the most interesting department of the science; to others it is the entrance and outer court of the temple; and when we realise that for every shade of colour, for all the exquisite beauty of flowers, for the endless difference in the size, forms, and textures of leaves, for the shape and colour of fruits and seeds, there are, if we only knew them, good and sufficient reasons, nature seems endowed with new and vivid life, with enhanced claims on our love, wonder, and devotion."

From this point of view a great mass of facts is presented dealing especially with such subjects as fertilization and seed distribution but also including almost every line of inquiry connected with plant life.

Although the flora dealt with is so limited in range, the book will be of interest and value alike to students and nature-lovers in every locality. This is especially true of the introduction, wherein a concise but comprehensive general discussion of its many problems supplies a most readable summary of the subject.

* Avebury, Lord (John Lubbock). Notes on the Life History of British Flowering Plants 8vo. Pp. i–xxiii + 1–450. *f. 1–352.* London and New York, 1905. The Macmillan Co.

It will doubtless be regretted by some that Lord Avebury did not adopt a systematic sequence from the lowest forms to the highest and enter upon the principles of classification sufficiently to show the correlation of the increasing complexity of the structures and functions described with the higher position accorded the plant in the scheme. This, however, might introduce much debatable matter, and is not included in the scope of the book.

Upon another much-debated subject his opinion is of interest in view of recent discussions. "In fact, it is becoming more and more a surprise how the older botanists can have regarded species as fixed and invariable. . . . It may almost be said that, as a rule, when plants are studied under dissimilar conditions, or in various parts of their area, they will be found to present considerable differences, so that, as our knowledge advances, the definition and limits of species become, not more easy and definite, as might perhaps have been expected, but more and more difficult and debatable." This conclusion will hardly be conceded by those who believe that a wide range of individual differences is by no means inconsistent with sharply defined specific limits, nor will it be too favorably received by the believers in the new doctrine of mutation.

The work will be hailed as a valuable contribution to a branch of botanical investigation which receives a smaller share of attention than its fascinations would lead one to expect.

C. B. Robinson.

PROCEEDINGS OF THE CLUB

January 9, 1906

The meeting was called to order at 8:30 P. M., at the American Museum of Natural History, with President Rusby in the chair. Sixteen persons were present. After the minutes of December 12 were read and approved, the following names were proposed for membership :

Miss Sara Robinson, 120 West 24th St., N. Y. City.

Miss Lucy J. Crosson, 215 West 44th St., N. Y. City.

The annual reports of the treasurer, secretary, corresponding secretary, editor, and the editor of TORREYA were then read and placed on file. The committees reported progress. No report was rendered by the committee on admissions or the committee on finance.

The following officers were elected for the ensuing year:

President, Dr. H. H. Rusby; vice-presidents, Prof. Edward S. Burgess, Prof. L. M. Underwood; recording secretary, Dr. C. Stuart Gager; corresponding secretary, Dr. John K. Small; editor, Dr. John Hendley Barnhart; treasurer, Dr. Carlton C. Curtis; associate editors: Dr. Alexander W. Evans, Dr. Tracy E. Hazen, Dr. Marshall A. Howe, Dr. D. T. MacDougal, Dr. W. A. Murrill, Dr. Herbert M. Richards, Anna Murray Vail.

A request from Mrs. E. G. Britton for a grant of $100 from the Herrman fund to be used in illustrating new species of mosses from the Southern States and the West Indies was read and the application approved by the Club.

Miss Crosson and Miss Robinson were elected to membership, and the resignations of Mr. T. H. Kearney, Jr., and Dr. Voelkel were read and approved. The Club then adjourned until the next stated meeting.

C. STUART GAGER,
Secretary.

NEWS ITEMS

Professor Hugo de Vries has accepted an invitation to deliver an address in Philadelphia in April in connection with the celebration of the two hundredth anniversary of the birth of Benjamin Franklin by the American Philosophical Society.

Mr. Homer D. House, who was a graduate student in botany in Columbia University from 1902 to 1904, and has been of late an assistant in the U. S. National Herbarium, is now associate professor of botany and bacteriology in the Clemson Agricultural College of South Carolina.

Vol. 6 No. 3

TORREYA

March, 1906

A NOVEMBER DAY IN THE UPPER PART OF THE COASTAL PLAIN OF NORTH CAROLINA

By Roland M. Harper

In passing through the upper edge of the coastal plain of North Carolina several times in the last few years I had often wished for a chance to stop off and examine more closely some of the many interesting things seen from the car windows; but a favorable opportunity for doing so did not arrive until November 17 last. On the morning of that day I alighted at Hamlet, in the fall-line sand-hills of Richmond County, and a few minutes later boarded a train bound for Wilmington. Leaving the train shortly after 10 o'clock at Pembroke, in Robeson County, 32 miles distant, I spent the remaining daylight hours in walking back along the railroad — a perfectly straight and nearly level route — to Laurinburg, in Scotland County, about midway between Hamlet and Pembroke. (The counties mentioned all border on South Carolina.) Notwithstanding the lateness of the season, *Aster squarrosus* and one or two other species were still in bloom, and the weather was all that could be desired.

The fall-line sand-hills and their characteristic flora, which are so well developed for some fifty miles northeast of Hamlet, do not seem to extend more than ten miles southeast of there. Continuing in that direction the face of the country gradually flattens, until at Pembroke, which is some eighty miles from the coast, it seems as level as the flat pine-barrens in the coast counties of Georgia. As to whether the same topography continues all the way to the coast or not I have no definite information; but it seems likely that it does, since the railroad is said to be straight all the way to Wilmington.

[No. 2, Vol. 6, of Torreya, comprising pages 21–40, was issued February 19, 1906.]

Although no genuine pine-barrens (by pine-barrens being understood those parts of the coastal plain in which pines of the section *Euaustrales* [*i. e.*, *P. palustris* or *P. Elliottii*] predominate over all other trees, and grow so far apart as not to give an appreciable amount of shade) were seen between Hamlet and Pembroke, * the rugged topography and mesophytic forests which are so characteristic of some of the upper parts of the coastal plain in Georgia were likewise wanting. This cannot be fully explained, however, until the details of coastal plain geology in the Carolinas are better known than at present. At some points between Pembroke and Laurinburg, nevertheless, the topography and flora showed striking resemblances to various parts of the upper third of the coastal plain of Georgia, but without having traced the same "plant-formations" through South Carolina I could not correlate them more minutely.

No rocks of any kind were seen in the whole 32 miles, and no ponds or other evidences of limestone, with a single apparent exception noted below. The whole country as far as I went seemed to be covered with sand, presumably of the Columbia formation, and as a natural consequence none of the streams seen were at all muddy. As in New England and the Georgia pine-barrens alike, the smaller streams were quite clear and the larger ones stained brownish with vegetable matter. The mantle of superficial sand varies somewhat in thickness. A little northeast of Hamlet, railroad cuts ten feet deep do not reach the bottom of it, but toward the coast it thins out considerably, and is then easily distinguished from the older formations underlying it.

Much of the country traversed that day, outside of the sand-hills and swamps, is now under cultivation, and most of the rest has been lumbered over. Three pines, *palustris*, *serotina* and *Taeda*, were frequent the whole distance, the last-mentioned the most abundant at present, though it may not have been so before the lumbermen began operations. *Taxodium imbricarium* was also frequent, always in non-alluvial swamps, with a little more

* At the present writing I have no information as to just how far inland the pine-barrens extend in North Carolina, but this could doubtless be supplied by any botanist who has crossed the whole coastal plain of that state.

humus than it usually tolerates in Georgia. *Chamaecyparis* was seen only in bogs in the sand-hills, extending a considerable distance northeast of Hamlet * but not more than ten miles southeastward. *Magnolia glauca*, it is scarcely necessary to remark, appeared in all the swamps.

In flat damp soil between the little stations of Pates and Alma in Robeson County were seen quite a number of plants which are chiefly confined to the pine-barrens, such as *Lycopodium alopecuroides*, *L. carolinianum*, *Andropogon corymbosus*, *Campulosus aromaticus*, *Rynchospora axillaris*, *Eriocaulon decangulare*, *Tofieldia glabra*, *Sarracenia flava*, *Ilex glabra*, *Eupatorium rotundifolium*, *Arnica acaulis* and *Marshallia graminifolia*. The *Tofieldia* is of rather local distribution, being known only from the coastal plain of the Carolinas. Many of the specimens of it were still in flower. In ditches along the railroad near the same place *Iris tripetala* was quite common, but I was unable to determine its natural habitat.

Both species of *Zenobia*, which were previously strangers to me (having perhaps never been collected in Georgia), were seen occasionally along here. One of them had already been reported from this county by Mr. C. L. Boynton.†

In several creek swamps between Red Banks and Laurinburg I noticed *Nymphaea sagittifolia*, quite abundant and in excellent condition, most of the specimens showing both floating and submersed leaves and fruit. The geographical distribution of this species is not well understood. It has been reported from the vicinity of Fayetteville in a neighboring county by Mr. Boynton,‡ and it was, of course, discovered in South Carolina. But no one has ever seen it in Georgia, apparently, and at least one of the Alabama stations mentioned in Mohr's Plant Life of Alabama (the one in Tuscaloosa County) is in an artificial pond (as I am informed by Dr. E. A. Smith, who found it there), so does not count.

Smilax Walteri, which, like *Nymphaea sagittifolia*, seems to be

* See Torreya **3**: 122. 1903.
† Biltmore Bot. Stud. **1**: 146. 1902.
‡ Biltmore Bot. Stud. **1**: 148. 1902.

confined to the coastal plain, climbs over bushes in the same swamps, and as its leaves had already fallen ts bright red berries made it very conspicuous. *Cyrilla racemiflora*, which has a somewhat similar range, also accompanied it.

In Scotland County, about midway between Maxton and Laurinburg, the railroad passes through a broad shallow depression several acres in extent, which doubtless becomes a pond in wet weather. *Panicum digitarioides* occurs on every square foot—and in fact almost every square inch—of this depression, and *Pinus Taeda* in the shallower parts around the edges. These two species give the place an aspect very like that of some similar depressions about the same distance from the fall-line in Twiggs County, Georgia, but the geographical relations between them have, of course, not yet been worked out. The flora of this pond —or savanna, as it might be termed—has a good deal in common with that of the shallower ponds in the Lower Oligocene region of Georgia. In it I found among other things *Manisuris rugosa* (but the *Manisuris* in similar habitats in Georgia is *M. Chapmani*), *Scleria gracilis, Rhexia aristosa* and *Breweria aquatica*. Without having access at present to literature in which details of plant distribution in North Carolina are given, I should imagine that some of these might not have been seen in that vicinity before. For instance, the *Rhexia*, I believe, was not previously known between Delaware and South Carolina.*

A little nearer Laurinburg I found a few specimens of *Eriophorum virginicum* in a small bog, and I am pretty sure I saw the same thing early in the morning in some sand-hill bogs northeast of Hamlet. It is much rarer in the South than in the North.† *Kuhnistera pinnata* was noticed during the day in several dry sandy places, even a little north of Hamlet. It is strictly confined to the coastal plain, as far as known, and probably does not range much farther north than this.

Judging from what I saw on this November day, an examination of the same territory in summer would prove very interesting, and it is to be hoped that this and other parts of the south-

* See Bull. Torrey Club **28**: 476. 1901.

† See Rhodora **7**: 72. 1905.

ern coastal plain will soon be explored more thoroughly, not so much with a view of discovering new species or new stations for old ones, which has been the incentive for much of the botanical work which has been done in the past, as of determining the distribution and habitat relations of each and every species. When this is done it will perhaps not be a difficult matter to work out the historical development of the flora with some degree of accuracy.

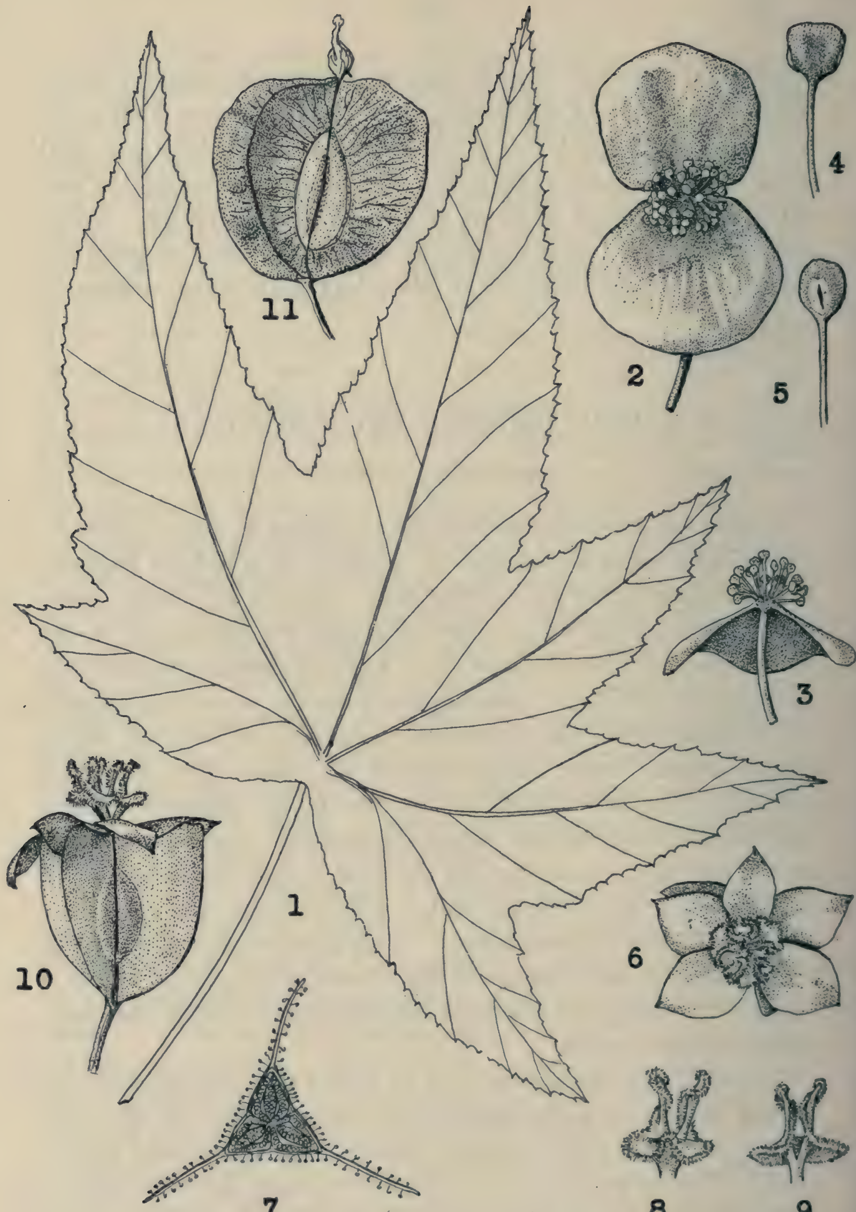
UNIVERSITY, ALA.

A NEW BEGONIA FROM BOLIVIA

BY GEORGE V. NASH

During his travels in the interior of Bolivia in 1901–2, Mr. R. S. Williams found an interesting *Begonia*, of which he brought back herbarium material in fruit only. Dr. H. H. Rusby compared this material on a recent visit with the specimens in the herbarium of the Royal Gardens, at Kew, England, and could find nothing there like it. Seed, secured from the herbarium material already referred to, was sown, and in January of this year plants thence derived came into flower at the New York Botanical Garden. This has enabled me to confirm Dr. Rusby's opinion that the plant is a species hitherto unknown. As group characters in the large genus *Begonia* are based upon the structure of the flowers, it is a difficult matter without these safely to state whether a given *Begonia* is new. This plant is unusual in having the perianth in both forms of the flower of a pellucid green, a condition forming an odd and pleasing contrast with the deep orange of the anthers.

Mr. Williams informs me that he found this *Begonia* growing among moss on a damp shady bluff, a short distance to the north of the little town of San Buena Ventura. This place is at an elevation of about four hundred and twenty meters above the sea ; it is located in about S. Lat. 14° 25′ and W. Long. 67° 20′, on the Beni River which joins its waters with those of the Mamore River at the southern boundary of Brazil to form the Madeira, one of the tributaries of the Amazon.



BEGONIA WILLIAMSII Rusby & Nash

1. Leaf, natural size. 2. Staminate flower, × 2. 3. Staminate flower, longitudinal section through receptacle, × 2. 4. Stamen, posterior view, × 11. 5. Stamen, lateral view, × 11. 6. Pistillate flower, × 2. 7. Ovary, transverse section, × 4. 8. Style, posterior view, × 4. 9. Style, anterior view, × 4. 10. Pistillate flower, lateral view, × 2. 11. Fruit, lateral view, × 2.

In the following description the characters of the plant, excepting as to its flowers, were taken from the herbarium material referred to above, Williams, *no. 600*, Nov. 14, 1901, in the herbarium of the New York Botanical Garden ; the characters of the flowers were drawn from fresh material secured from the plants grown from seed, and preserved in the herbarium of the same institution.

Begonia Williamsii Rusby & Nash

Stems up to 2 dm. tall, from a tuberous base. Leaves up to 8 ; petiole 5–7 cm. long, smooth and glabrous ; blade palmately veined, smooth and glabrous on both surfaces, marked on the upper surface with silvery spots, peltate, the portion below the umbilicus to that above as 1 or 2 to 20, up to 1 dm. long, the greatest diameter up to 1.5 dm., 5–6-lobed, the lobes up to one half the diameter of the blade, lanceolate-triangular to lanceolate, acuminate, crenate, the teeth cuspidate, the basal sinus an obtuse angle, the remaining ones acute : peduncle up to 13 cm. long, glandular-pubescent with short spreading hairs, as are also the divisions of the 5-chotomous cyme and the pedicels : perianth of the staminate flowers with 2 divisions, rarely with 1 or 2 smaller narrow inner ones, pellucid, green, orbicular or nearly so, the one 1–1.25 cm. in diameter, the other slightly smaller ; the stamens unequal in length, 2–3 mm. long, inserted on a somewhat convex receptacle ; the glabrous filaments salmon ; the anthers orange, orbicular-reniform, much shorter than the filaments, about 0.75 mm. long and 0.8–0.9 mm. wide, broadest above the middle, rounded truncate at the apex : pistillate flowers on pedicels 1–1.5 cm. long, the 5 divisions ovate to broadly ovate, acute, 5–6 mm. long and 3–5 mm. wide, the inner the narrower, the ovary 7–8 mm. long and about 3.5 mm. broad, elliptic, the median line, including the wings, about 1 cm. long, two of the wings truncate at the apex or nearly so, and narrower than the third wing which has the upper line somewhat ascending, all the wings converging toward the rounded base of the ovary, the ovary and wings glandular-pubescent, the placentas divided to the base into two somewhat curved lamellae, these ovule-bearing to the base on both sides : styles persistent, 4–5 mm. long, free or slightly united at the base, 2-branched, each branch broadened and flattened at the base and this margined by the stigmatic surface which continues spirally to the apex and is continuous at the base between the two branches, often as a pronounced undulation :

capsule, including the wings, 13–15 mm. long, 16–19 mm. wide, two of the wings semicircular or slightly bulging near the apex, the third wing with a rounded point, making it truncate on the upper side: seed oval, 0.24–0.26 mm. long and 0.15–0.17 mm. wide, brown.

It is a pleasure to name this interesting plant in honor of the collector, who spent so many months traversing the wild regions of the Andean country, and who brought back a large and valuable collection of plants.

A FUNGUS PARASITIC ON A MOSS

By George Massee

Some time ago Mrs. N. L. Britton placed in my hands for examination a moss, *Weisia viridula*, collected by Mrs. A. L. Taylor, at Thomasville, Ga., which was considered to be attacked by a parasitic fungus. On examination this assumption proved to be correct. The capsule of this moss under normal conditions is usually erect and symmetrical, but when attacked by the parasite it becomes distinctly curved and unsymmetrical.

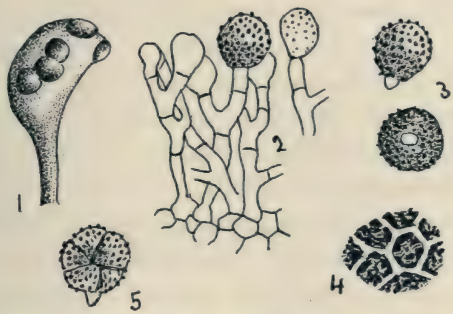
Notwithstanding the fact that over one hundred and fifty species of fungi are listed as occurring on mosses, some as parasites, others as saprophytes, the fungus under consideration belongs to *Epicoccum*, a genus not included in this list. Furthermore, the specific characters unfortunately do not conform with those of any described member of the genus, hence there appears to be no alternative to the establishment of what is usually termed "a new species," which, from its treatment of the host, must hereafter be known as *Epicoccum torquens*.

So far as observation goes *E. torquens* confines its attention to the fruit or capsule of the moss, where it forms minute, scattered or crowded, dark-colored warts.

The mycelium is strictly localized, and each pustule formed implies an independent infection; hyphae permeate the entire thickness of the wall of the capsule, but are prevented by the air cavity from reaching the spore-sac.

The genus *Epicoccum* stands in need of revision. On turning

to Saccardo's Sylloge it is found that the genus is included in the group Tubercularieae, where it ranks first in the section Amerosporae, characterized by having the conidia continuous or one-celled. Now, as a matter of fact, most of the species have many-celled conidia and technically should be included in section Dictyosporae, only three or four species, including the one under consideration, having one-celled conidia. The sum-total of close affinity between the various species appears to have been too obvious to admit of their separation into two genera, placed miles apart, as would have been the case if numbers and arrangement of septa had prevailed. Saccardo, however, temporarily solved



EPICOCCUM TORQUENS Massee

1. Capsule of *Weisia viridula* showing the parasite in situ. 2. Conidiophores originating from peripheral cells of the stroma. 3. Free conidia of *E. torquens*, side and basal views. 4. The epispore is described as minutely warted, and it appears to be so under a mag. of 400 diam.; the apparent warting is however in reality due to the epispore becoming rigid at an early stage of development, and being afterwards torn into areolae by the continued increase in size of the spore, as shown in the figure. 5. Conidium (many-celled) of *E. purpurascens* Pers. 1, slightly magnified; 2, 3, and 5, × 400; 4, × 1200.

the problem by describing the many-celled conidia as having the surface "reticulated," such reticulations being in reality the lines of septa dividing the spore into several cells.

The species may be defined as follows:

Epicoccum torquens sp. nov.

Stromata almost circular, convex, isolated or sometimes more or less confluent, about 350 μ diam., brownish; conidia globose, sessile, 1-celled, brown, minutely warted, 15–20 μ diam.; conid-

iophores sparingly branched, septate; springing from the compact peripheral cells of the stroma.

Allied most nearly to *E. scabrum* Corda, in having 1-celled conidia; differing much in the larger polygonal cells composing the stroma, the much longer, branched, septate conidiophores, and finally its parasitic habit.

ROYAL GARDENS, KEW.

THE HOME OF DUDLEYA RUSBYI

BY H. H. RUSBY

In the North American Flora (**22**: 35) the type locality of this plant is given as "near Prescott, Arizona." The mistake, perhaps copied from an inaccurate distribution label, should be corrected, especially since the species has been collected but once, and under conditions of environment quite different from those about Prescott, 200 miles to the northwest. Careful search was made on a number of occasions and in various directions, but only the little cluster of a half dozen plants first collected was ever seen. The plant is apparently a genuine rarity, and this brief description of its locality and habitat is given in the hope of aiding some future collector to rediscover it.

At Clifton, Arizona, there was, in 1881, a copper smelter, located close to the right bank of the San Francisco River, and supplied with ore brought by a short railroad from mines owned by the Leszynsky Brothers. These mines were about four miles, as I remember, from the smelter. Several miles beyond them, that is, several miles farther up the cañon, were some very rich mines owned by the Metcalfe Brothers, then undeveloped except for so much work annually as the law required for the holding of the claims. These mines were on the north side of the cañon, and included a small mountain of ore rich in native copper. Just at the base of this mountain, but in the bank on the opposite side of the cañon, was a dug-out hut, built for the accommodation of the prospectors who worked this mine. In this hut I lived in the late winter and early spring of that year, when but few plants had commenced their annual growth. The

trail to the mine crossed the cañon diagonally upward, from this hut, and the ascent of the mountain commenced just below a jutting point of rock, the top of which was about breast-high above the trail at that point. On the top of this rock, which was covered by a little stony soil, grew the plants referred to. With the exception of a few plants of *Koeleria cristata* Pers. and *Arabis Holboellii* Hornem., nothing else was in bloom in the immediate vicinity. Just above was a dense growth of *Arctostaphylos pungens* H.B.K., and some shrubby oaks. In the open, sunny ground across the cañon were scattered clumps of the last named, just coming into bloom, as well as of *Eriodictyon californicum* Decne. in full bloom, with numerous tufts of *Carphochaeta Bigelovii* Gray. Along the small brook were large trees of *Alnus oblongifolia* Torr., *Platanus Wrightii* Wats., *Populus Wislezeni* (Wats.) Sarg., and *Quercus Emoryi* Torr. (?), and underneath them, close to the banks of the stream, such plants as *Habenaria sparsiflora* Wats., *Aquilegia chrysantha* Gray, *Thalictrum Fendleri* Engelm., and various Pentstemons. Among the stones near the brook grew *Thlaspi alpestre* L. and one or two Thelypodiums. Farther up the cañon, where the country was very rough and precipitous, grew, among other conifers, the very handsome *Cupressus arizonica* Greene, though the specimens were not numerous. The entire region was evidently one of great botanical interest for anyone who could be there after the advent of the rainy season. Possibly the *Dudleya* might then be more abundant, though its appearance was that of a distinctly vernal plant.

PROCEEDINGS OF THE CLUB

January 31, 1906

This meeting was held at the New York Botanical Garden. President Rusby presided, and 27 persons were present. The following persons were elected to membership: Richard H. Allen, Chatham, N. Y.; H. R. Bishop, Chappaqua, N. Y.; Albert Calman, 450 West End Ave., N. Y. City; Charles L. Chase, 343 West 87th St., N. Y. City; Dr. Alfred Meyer, 785

Madison Ave., N. Y. City; Gifford Pinchot, Washington, D. C.; E. L. Rogers, 58 West 47th St., N. Y. City; Charles E. Seiter, 100 William St., N. Y. City; Dr. George T. Stevens, 22 East 46th St., N. Y. City.

President Rusby appointed as a finance committee Judge Addison Brown, and Prof. H. M. Richards. An invitation was read from the American Philosophical Society of Philadelphia, to attend their celebration of the 200th anniversary of the birth of Benjamin Franklin. A motion that the Club accept the honor of the invitation was made and carried, and President Rusby was delegated to represent the Club at the celebration.

Resignations were read and accepted from Miss Nina L. Marshall and Mr. C. C. Doorly.

In response to an inquiry from the recording secretary concerning the duties of that officer, a motion was made that the president, secretary, treasurer, and editor-in-chief be appointed a committee to revise the constitution and by-laws and report at the earliest possible time. The motion was carried.

The resignation of Dr. D. T. MacDougal from the editorial staff was read, and, on motion, accepted.

The Board of Editors were elected a Budget committee for the ensuing year.

Dr. Britton exhibited the photographic reproduction of the "Dioscurides Codex Aniciae Julianae picturis illustratus, nunc Vindobonensis Med. Gr. I," recently acquired by the library of the New York Botanical Garden.

This work is of importance in the study of the history of botany, on account of the large number of illustrations of plants which are for the most part based on originals presumably of the fifth century, and are now here reproduced in fac-simile for the first time. The original MS. is one of the treasures of the Imperial Library of Vienna. It is said to date from 512 A. D., and was written and the miniatures painted for the princess Anicia Juliana, of Byzantium, and is the basis of all the early herbals. The work is Vol. 10 of the "Codices Graeci et Latini Photographici Depicti," a series of reproductions of valuable manuscripts issued under the editorial supervision of Dr. de Vries, the librarian of the

University of Leyden. It consists of two folio volumes bound in heavy oak boards and is a faithful facsimile of the celebrated original, reproducing it down to the smallest fragment. The plates are of great beauty and remarkable for a certain vigorous distinction and decorative character that illustrators of the present day would do well to study. Not the least interesting are the miniatures showing groups of physicians and botanists in conclave, painters at work on plant pictures, the portrait of the lady Juliana herself, and lastly a most beautiful ornamental title page. Historical prefatory and descriptive matter are by Anton von Premerstein, Carl Wessely, and Joseph Mantuani.

Previous to the present reproduction, plates of this MS. were prepared under the supervision of Jacquin, two impressions of which are known to be in existence, the one having been in the possession of Linnaeus is now in the library of the Linnean Society of London; the other was sent to Sibthorp to be used in the compiling of his Flora Graeca. This latter copy is now preserved at Oxford.

The first paper on the program as announced was by Professor L. M. Underwood, on "Six new Fern Genera in the United States." Professor Underwood gave a brief account of the additions to the fern flora of the United States since the year 1900. Six genera and over forty species are included in the list, which also includes several species new to science. The list will appear in the *Bulletin* for March. The genera new to the country, and some of the more interesting species, were exhibited. The paper was discussed by President Rusby and Dr. Murrill.

The second paper was by Mr. H. A. Gleason, entitled, "Notes on the Flora of Southern Illinois." The southern portion of Illinois is crossed by an eastern prolongation of the Ozark Mountains, which have a marked influence on the rainfall. The flora is characterized by the presence of about four hundred species of distinctively southern plants, constituting three separate floras, each of which has entered the State from a different direction. Of these, the most sharply defined is the coastal plain flora which has entered the region by migrating up the Mississippi River from the south. The extensive cypress swamps

are largely composed of coastal species. An Alleghenian element has crossed the highland region of Kentucky and southern Indiana, and is well represented in Illinois in the area of heavy rainfall along the Ozark hills, the third is a southwestern flora, characterized mainly by xerophilous species. They have migrated along the Ozark uplift through Missouri, but in Illinois they have for the most part left the hills for the arid region just to the north. The three migration routes all follow ecological isotones and the three floras are never associated.

The last paper was by Mr. R. S. Williams on "Plant Collecting in the Philippines." The speaker gave some account of his recent botanical journey to the islands. Leaving Seattle in September, 1903, the steamer went by the northern route, passing in sight of snow-covered mountains in the Aleutian islands some half way over and reaching Yokohama after a voyage of sixteen days. The boat touched at various ports in Japan, remaining for a day or two at each place. The southern islands are nearly destitute of forests, and although appearing green and fertile from a distance, are often covered with only a low species of bamboo grass that no domestic animal can eat, so that horses, cattle, etc., are scarcely to be seen. From Japan the boat went to Shanghai. This city, seventeen miles up the Yang Tse Kiang, is in the latitude of northern Florida, and among other sights along the low river-banks are to be seen low straw huts scattered about the fields in which are preserved the thin layers of ice that form over the shallow pools in winter. From Shanghai the steamer proceeded to Hongkong, where a smaller boat was taken for Manila, which place was reached in thirty-four days out from Seattle. Mr. Williams shortly crossed over Manila Bay to the Lamao River, one of the streams descending from Mt. Mariveles, where several months were spent in collecting. The locality proved to be one of the easiest to get about in of any visited in the islands, more or less open forests extending from a few miles back from the coast almost to the mountain summit, some 4,200 feet above sea-level. The higher slopes about this mountain are more or less inhabited by Negritos, considered to be the earliest settlers of the Philippines. They are a race of low slender

stature, with short curly hair, and obtain a precarious living while wandering through the forests. They are excellent tree climbers and most useful to the collector if they can be induced to work. From this region Mr. Williams went to the town of Baguio, some one hundred and fifty miles northward, and at an elevation of 5,000 feet, remaining till the beginning of 1905. During the summer of 1904 the heaviest rainfall on record for the islands was encountered, one hundred and thirty-nine inches falling in the months of June, July, August, and September. Going southward from this place, the time from January to July was chiefly spent in the island of Mindanao, first collecting near Zamboanga in the southwest part, then in the southeastern country about the Gulf of Davao and Mount Apo. This mountain is one of the highest in the islands, nearly 10,000 feet, and proved a most interesting field where a lifetime, rather than a few months, could be spent in exploring its often almost inaccessible mountain sides, cañons and streams. On returning to Manila from Mindanao, the boat stopped at Jolo, the chief town of the Sulu Archipelago, for a few days, and here the last collecting of the trip was done before returning to the United States.

Professor Underwood was asked to act as delegate to the Council of the Scientific Alliance for 1906.

The meeting adjourned until the second Tuesday in February.

C. Stuart Gager,
Recording Secretary.

NEWS ITEMS

Dr. A. B. Rendle has been appointed keeper of the botanical department of the British Museum in the place of Mr. George Murray, who has recently resigned.

The spring course of lectures in the Wagner Free Institute of Science of Philadelphia includes ten lectures on "North American Trees" by Dr. John W. Harshberger, of the University of Pennsylvania.

Dr. Forrest Shreve, Adam T. Bruce fellow in biology in Johns Hopkins University, has been appointed professor of biology in

the Woman's College, Baltimore. Dr. Shreve is now engaged in researches at the tropical laboratory of the New York Botanical Garden at Cinchona, Jamaica.

Mr. E. S. Salmon, who for several years has been pursuing bryological and mycological studies at the Royal Botanic Gardens at Kew, has recently accepted the post of mycologist in the Southeastern Agricultural College at Wye, near Ashford, Kent. Mr. Salmon's "Monograph of the Erysiphaceae" was published as a memoir of the Torrey Botanical Club in 1900.

Dr. and Mrs. N. L. Britton and Dr. Marshall A. Howe, of the New York Botanical Garden, left New York on February 24, for a few weeks of botanical collecting in Porto Rico and the adjacent island of Culebra. Professor William Morton Wheeler, of the American Museum of Natural History, Mr. John F. Cowell, director of the Botanic Garden of Buffalo, and Miss Delia W. Marble, of Bedford, N. Y., are also members of the party.

Vol. 6 No. 4

TORREYA

April, 1906

ABNORMALITIES IN THE FRUITING HABITS OF OPUNTIAS

By David Griffiths

There have appeared recently an article by Professor Toumey,* which was reviewed by Dr. Harris,† and a note by Dr. Cannon,‡ depicting certain abnormalities found in the fruiting habits of the genus *Opuntia*, Professor Toumey's brochure using these abnormalities to prove the caulome origin of the fruit and Dr. Cannon's simply to record an observation upon a single specimen. Besides the above there is much literature upon this subject, reference to which need not be made here, inasmuch as Mr. Harris quotes a considerable part of it in the above review. There is, however, more to be said upon this subject and it is my object to record some observations and investigations which have been made during the past five years, with little attempt, however, at generalization except to show an apparent relation between sterility of fruit and its assumption of the character of the stem.

To me the strongest evidence of the caulome nature of the fruit is to be found in its leaves subtending pulvini which there is strong evidence for considering modified branches. In a few species there is not only a development of spines and spicules from the pulvini for a number of years after the maturity of the joint but also a distinct development of the tissue of the pulvinus itself into a columnar structure (modified stem) sometimes an inch long. These structures develop gradually for ten years or

* Bull. Torrey Club 32: 235. 1905.
† Bull. Torrey Club 32: 531. 1905.
‡ Torreya 5: 216. 1905.

[No. 3, Vol. 6, of Torreya, comprising pages 41–56, was issued March 16, 1906.]

more in at least one species and nearly cover the old trunks with the tightly appressed, curved and twisted cylinders completely covered with spicules. If then we find these same pulvini, subtended by leaves, upon the fruit, we can scarcely produce stronger evidence of its caulome nature.

Upon the plains east of San Luis Potosi, Mexico, there are very extensive thickets of *Opuntia Kleiniae*, one of the *tasajillos* of the Mexicans. The plant is exceptionally abundant in the foothills and surrounding the bases of the numerous lone peaks and ridges which are found upon the plains detached from the main mountain range. It is associated with the maguey, mesquite, and other typically desert plants. It presents two strikingly different aspects — indeed they are so different as to make one doubt their identity, were it not for an exceptional plant in which the two extremes are combined in one individual. Simply a variation in the form of plants of the same botanical species gives no great concern, but when as in this case the difference in form is coupled with a radical difference in the fertility of the fruits, the variation has an added interest.

The form of the plant which we shall assume to be typical is the most common one to be found in the general region. It is that form described in the books and is an open-branching plant three or four feet high. It has two forms of branches, one easily separable and relatively short, while the other is longer as a rule, possesses stronger and longer spines, and is firmly attached to the parent plant. Its fruits when mature are always bright red and *sparingly* proliferous.

The other form, while somewhat less abundant in the general region, is even more conspicuous in certain localities upon the plains. It has a more congested habit of growth, a much larger number of the short, easily separable reproductive branches, and its fruits are often entirely green, although they are also often red or with simply a blush of red, and they are *exceedingly* proliferous and produce no fertile seed.

In both forms and in many other species of the Cactaceae the fruits put forth a vegetative growth and develop into new plants whenever they come in contact with the ground. These fruits,

so far as one can see, develop just as readily and are just as easily separable from the plant as the joints themselves, whose main function appears to be vegetative reproduction, and this development of the fruit is itself a purely vegetative reproduction, for it is from the areoles and not from the seed that the new plant springs. Both forms also produce besides the ordinary short cylindrical branches almost perfectly globular ones. These are much more numerous upon the congested form. These globular branches differ in no way from many of the green fruits of the proliferous form, except that the fruits have borne flowers and have the scar of it left at their apices. Neither contain seed but there is invariably a rudiment of a seed-cavity in the fruits but none of course in the branches.

The chief thing to be noted here is that we have one form of the plant with an open-branching habit producing some fertile seed and comparatively few vegetative branches; and the other having lost its seed-producing habit, has modified and increased its facilities for vegetative reproduction at least ten-fold. In no case have I been able to find seed in the proliferous form. Fruits without fertile seed are common in the fertile form also and seldom is there a full quota of fertile ones produced even here.

To test still further the correlation between sterility and increase in vegetative facilities of reproduction, an attempt was made to discover whether the few proliferous fruits of the fertile form were more likely to be sterile than the non-proliferous fruits upon the same plants. An examination was made of a number of proliferous and non-proliferous fruits upon two typical plants of the fertile form with the following results. Of course, many seeds were found with almost perfect shells but having aborted embryos. Where there was any doubt, the seeds were cut open and examined. Usually no dissection was necessary. Five proliferous fruits from each plant were selected and both that attached to the stem and the one growing from it were examined.

The ten proximal fruits contained fertile seed as follows: 3, 0, 0, 0, 4, 4, 1, 0, 3, 2. The ten distal ones contained fertile seed as follows: 1, 0, 10, 0, 0, 0, 0, 4, 0, 1.

An examination was next made of fruits from the same plants giving rise to branches but not to fruits. They showed fertile seed as follows: 0, 0, 3, 4, 4, 4, 0, 5, 6, 8, 1, 3.

Again another examination of normal fruits bearing neither fruits nor branches was made, with the following results: 4, 8, 0, 9, 9, 4, 10, 6, 0, 4, 6, 10, 8, 3, 5.

The above figures are very suggestive but nothing more than that. At least a hundred times more data are necessary to enable one to draw conclusions. But they represent all the data that limited time could secure. The tunas which had been depended upon for food and water for about ten hours failed to satisfy longer, necessitating a postponement of the investigation.

To summarize we might tabulate as follows:

1. The proliferous form of the plant is sterile, so far as I have been able to determine, absolutely.

2. Fertile seed in fruits giving rise to other fruits average 1.7.

3. Fertile seed in fruits giving rise to vegetative branches average 3.6.

4. Fertile seed in non-proliferous fruit average 5.7.

Similar observations might be made upon *O. leptocaulis*, a closely related plant of very similar habit.

The simulating of the stem by the fruit as it loses its fertility is very evident in *Opuntia fulgida*. Normally, the fruit of this species is spineless or, at most, bears only a few fugacious, hair-like, unsheathed spines in the normal fertile specimens. In many cases, however, certain plants will be found in which the fruit bears a goodly proportion of sheathed spines like those of the stem. Experience shows that these spiny-fruited forms bear much fewer fertile seeds than those which do not bear spines. It is equally apparent that it is in the drier situations that sterility occurs and that spines develop on the fruits when they are two to four or five years old, while there may be no evidence of them the first year. For the benefit of those not familiar with *O. fulgida*, it should be stated that the fruit is proliferous, one developing from another until there is a branched, pendant bunch, in some cases a foot long, remaining attached to the plant for a number of years. It is the proximal ones of the bunch which

show most pronounced spines. An experiment which might throw a great deal of light upon the influence of drought conditions upon the sterility of the fruit in this species ought to be undertaken. Cuttings from a plant which in nature is nearly sterile should be grown under artificial irrigation. With suitable checks the influence of drought upon sterile conditions might be shown. The influence of this factor in the lack of seed-production in cultivated and other crops of course is well known but we have here an entirely different condition of things. This is not a case of temporary lack of seed-production caused by temporarily abnormal conditions but apparently at least habitual sterility brought about in a given perennial species growing in a certain situation and not taking place in the same species in another situation but a few miles removed, and this sterility accompanied by a simulation on the part of the fruit of one or more of the caulome characteristics. My observations indicate that it is on the desert mesas that the largest proportion of the sterile-fruited forms occurs in this species and that fruits of those plants growing in the foothills are more likely to be spineless.

There is probably no species of *Opuntia* in which the fruit simulates the stem more closely than in *O. subulata*. In plantations which have been examined in this country fruits with no constriction between them and the stem were the rule rather than the exception. In other words, the fruit in a very large percentage of cases was imbedded in the end of a branch.* Proliferous ones are also very common. Such features are equally true of *O. cylindrica* and the imbedding of the fruit in the end of a branch is not at all rare in *O. spinosior*, *O. versicolor* and *O. arborescens*. It is apparently more common in these species under cultivation.

The union of fruit and joint or the imbedding of the fruit in a joint is very common in the Platyopuntias and apparently it is more abundant in some species than in others. In a spineless form of *O. chlorotica* of which we have seen no mention in literature, the phenomenon is so common in some localities in southern

* See also Schumann's Gesamtbeschreibung d. Kakt. 681. *f. 103.* 1899.

Arizona that I, for a time, considered this the normal condition of the plant. In all cases observed the fruit-joint is small, very uniform and regular and has the same form as the normal joint. In 1903 a single plant of this variety in the Celero Mountains produced 18 of these fruit-joint structures and no normal fruits. In 1905 the same plant produced not less than 50 perfectly normal fruits with no abnormals. These were carefully examined but no insect or other injury was found to which the condition could be attributed, but I am inclined to look for some mechanical explanation for the phenomenon. This is the only species in which regular abnormal structures of this kind have been observed. Usually the fruit simply appears to expand on one side or the other into a joint-like structure with no regularity or symmetry. Such abnormalities are very common in the Mexican cultivated forms such as *Nopal amarillo*, *naranchado*, *camueso*, *teco*, etc.

A very peculiar set of fruit modifications is brought about by insect depredations. A dipterous insect which deposits its egg in the ovary of *O. Lindheimeri* invariably causes a reversion to the vegetative condition. The ovules become atrophied, the funiculi (?) developing into short, cylindrical, curved and twisted structures and the ovary remaining green. So far does the ovary change to the vegetative condition that it very commonly gives rise to joints so that we have joints developing from imperfect but good-sized fruits. Such growths have been very common in southern Texas for the past two years. Such structures, however, are never incorporated as a permanent part of the plant in this species but drop off early the following summer after the insects have matured.

A similar (possibly the same) insect affects the ovaries of *O. versicolor* in much the same way but the growth of joints from the ovaries is somewhat rare. Frequently in this, less frequently in *O. Lindheimeri* and commonly in other Cylindropuntias there is a tendency for the pistil to begin a reversion into the vegetative state and remain, so far as its hollow base is concerned, upon the ovary until the latter drops off of the plant. In some cases the base of the pistil actually enlarges slightly, *i. e.*, starts

to grow. When this structure is fully grown the ovary usually has a similar structure to that described for *O. Lindheimeri* and in addition is surmounted by this butt of a hollow style.

Perhaps the most peculiar abnormality of all, more rarely met with, is that in which the tissues of the joint simulate portions of the fruit. A few joints of the cochineal pear (*Nopalea cŏchinillifera*) were found the past season wherein a portion of the base of several joints had turned to the color of the fruit. Examination showed that the texture as well as the flavor was exactly that of the rind of the mature fruit. There were no fruits produced by any of these joints. The abnormal red portion was a little swollen and more prominent than the remainder, but further than this, there was no abnormality except that the vascular system for some reason was slightly knotted. It is not at all uncommon to find joints or portions of joints of *O. Kleiniae* or *O. leptocaulis* simulating their fruits in color. The red coloration in these species may occur at the proximal, distal or central portion or may take in the entire joint. A change in the tissue also accompanies the change of color but these joints often become incorporated as a permanent part of the plant body. It is not at all uncommon to find portions of the joints of *O. laevis*, and other Platyopuntias, adjacent to the fruits becoming somewhat changed when the latter ripens. Sometimes the tissues immediately surrounding the vascular bundles entering the fruits may simulate the color of the fruit for an inch below the areole while at other times the whole areolar region is colored red.

WASHINGTON, D. C.

CRATAEGUS OF DUTCHESS COUNTY, NEW YORK*

By W. W. EGGLESTON

With but little time for exploring in 1905, I had two things in mind in regard to my *Crataegus* problem. The first was to know the form in the field which Dr. Britton had considered nearest *Crataegus coccinea* L., and the second to cover as much unexplored territory north of the city as possible.

* Read before the Torrey Botanical Club, February 28, 1906.

The form of *coccinea* was first found at Persimmon Island, New Rochelle, by Professor E. H. Day in 1876, and in 1893 on the Harlem River near Fordham Heights Station by E. P. Bicknell. Although both of these stations have been destroyed I was able to find the plant; in fact it proves to be the most common thorn about the ledges of New York City and the Palisades of the Hudson. It seems to be the form described from Biltmore by Beadle as *Crataegus Boyntoni*, and later from Rochester, N. Y., by Professor Sargent as *C. Baxteri.*

Knowing that a limestone country is the best locality for *Crataegus*, for my general exploration I first went up the Harlem Railroad into the Taconic Mountains region from Pawling to Chatham, where I had seen plenty of thorns in 1904.

The best time to see thorns is in flowering time and a railroad train is an excellent place from which to locate a lot of them in short order. On May 21, 1905, I rode as far north as Millerton, about 90 miles from New York, noting the best thorn thickets on the way. I walked back five miles to Coleman's Station, seeing a few thorns on the way; the wooded hillside southwest of the station was a fine place for thorns, having several forms. My next stop was Pawling; here were two, *coccinea* and *pentandra*, not seen elsewhere. The next morning I stopped at Dykeman's Station, Putnam Co.; the pastures west of this station have many individuals, including several forms. In the afternoon I visited Bedford, Westchester Co., and walked two miles south and over a rocky hill to the west of the railroad, on my way back. This region is out of the limestone and I saw only the forms common about New York, *Biltmoreana*, *Boyntoni*, and *pruinosa.*

In order to cover a long range of territory I skipped from Pawling to Sharon Station. If one could go to Dover Furnace, using that as a base, he would find in a radius of five or six miles the best *Crataegus* country south of Millerton.

Another excellent way to find lots of thorns is to charter a good guide; this I did the next week going to Moore's Mills with Dr. C. C. Curtis.

The town of Unionville just east of Moore's Mills was the region principally searched; here we spent two days, including

a trip to the summit of Clove Mountain. Another day was occupied in a trip from Clove Branch to Brinckerhoff Station; this gave us two new ones, *Crus-galli* and *lobulata*.

Although the flowering time is the best for finding *Crataegus*, the autumn, when they are in mature fruit, is the best time to distinguish the forms, for in the mature fruits one can find the most critical points of difference.

In the autumn there was less time at my disposal than in the spring. On September 30, I went to Dykeman's and the next day to Pawling and Coleman's; the latter place was of particular interest, being very strong in the Intricatae of which *Boyntoni* is a member.

October 8 I went over most of my territory about Moore's Mills; the previous week Dr. Curtis had covered the part that I did not. Here is another fine station for Intricatae, but the form that interested me most was one Dr. Curtis found in 1904, this proving to be *deltoides* Ashe, found before by Dr. C. D. Fretz at Sellersville, Pa., only two trees; we found three stations.

The following list of thorns of Dutchess Co. includes also a few stations of interest south to New York.

Crus-galli

Crataegus Crus-galli L.

Brinckerhoff; Mt. Vernon, Harlem River, Woodmere, L. I., *Bicknell.*

Punctatae

Crataegus punctata Jacq.

Moore's Mills, Clove Branch.

Pruinosae

Crataegus albicans Ashe. (*C. dissona* Sarg.)

Moore's Mills, Coleman's; Dykeman's, Putnam Co.

Crataegus arcana Beadle.

Moore's Mills.

Crataegus cognata Sarg.

Dykeman's, Putnam Co.

Crataegus deltoides Ashe.

Moore's Mills.

Crataegus pruinosa (Wendl.) Beadle.

Moore's Mills ; Dykeman's, Putnam Co.; Bedford, Westchester Co.; New York Bot. Garden, *Shafer ;* Fort Lee, N. J., *Curtis.*

Tenuifoliae

Crataegus delucida Sarg.

Millerton, Moore's Mills, Coleman's.

Crataegus glaucophylla Sarg.

Coleman's.

Crataegus matura Sarg.

Millerton, Moore's Mills, Coleman's.

Crataegus pentandra Sarg.

Pawling ; Clove Mt., Unionvale.

Crataegus tenella Ashe.

Coleman's, Unionvale ; Dykeman's, Putnam Co.

Flabellatae

Crataegus polita Sarg.

Coleman's, Clove Branch.

Crataegus Pringlei Sarg.

Coleman's.

Crataegus tenuifolia Britton. (*C. Holmesiana* Ashe, not *C. Holmesii* Lesq.)

Moore's Mills.

Old nursery, Jerome Ave., New York City, *Bicknell.* (This is the form *C. villipes* Ashe.)

Crataegus lobulata Sarg.

Two miles south of Hopewell Junction.

Coccineae

Crataegus coccinea L. (Of Linné's herbarium, *fide* Sargent.)

Pawling.

Crataegus coccinea rotundifolia Sarg. (*C. Dodgei* Ashe, *C. Gravesii* Sarg.)

Coleman's, Moore's Mills ; Dykeman's, Putnam Co.

Intricatae

Crataegus biltmoreana Beadle. (*C. glandulosa* Pursh, not Michaux ; *C. modesta* Sarg., *C. premora* Ashe.)

Coleman's, Moore's Mills ; Dykeman's, Putnam Co.; Bedford, Westchester Co.; New York Bot. Garden ; Woodlawn, New York City, *Bicknell ;* Fort Lee, N. J., *Curtis.*

Crataegus Boyntoni Beadle. (*C. coccinea ?* Britton, *C. foetida* Ashe, *C. Baxteri* Sarg.)

Coleman's, Moore's Mills, Clove Branch ; Dykeman's, Putnam Co.; Bedford, Westchester Co.; Harlem River, Riverdale, and Ft. Washington, *Bicknell ;* Persimmon Island, New Rochelle, *Day ;* Ft. Lee, N. J., *Curtis.*

Crataegus intricata Lange.

Coleman's, Moore's Mills.

Crataegus.

No. 6a, Coleman's.

Tomentosae

Crataegus macracantha Lodd. (*C. ferentaria* Sarg.)

Coleman's, Moore's Mills, and Clove Branch.

A set of these thorns is deposited in the herbarium of the Torrey Club.

New York Botanical Garden.

A CAUSE OF FREAK PEAS

By J. M. Van Hook

After two years experimenting in the study and control of pea-blight * due to the fungus *Ascochyta Pisi* Lib., in which the germination of the diseased seed has been a part of the work, thousands of diseased seedling-peas have been observed. One *cause* for abnormal growth might be of interest to those whose attention has been called to freak peas by Clendenin † in the March number of Torreya of last year.

* Bull. 173, Ohio, Agr. Exp. Sta. 1906.

† Clendenin, Ida. Other Freaks of Peas. Torreya, **5** : 41–42. 1905.

The fungus attacks not only the growing pea-stems and leaves, but also the pods and thence may grow into the seed. Many peas which show no discoloration are infected. Consequently,

FIG. 1. *a*, pea seedling attacked by *Ascochyta*; lesion on side of stem; *b*, primary and secondary stems killed at tip by fungus; a fifth stem just starting; *c*, primary stem killed above; a branch and the buds in the axils of the two cotyledons developing; one of the latter killed at the tip.

when such peas are planted, the fungus immediately develops and rots the peas, thus reducing the per cent. of germination. Of those peas which do germinate, many do not get through the ground. In other cases, the pea comes up only to be attacked later by the fungus, which either kills or injures the stem near the growing tip or produces lesions on the stem. Fig. 1, *a*, shows such a lesion a little more than half way up the stem. It is not always necessary for the terminal bud or the stem to be *killed* in order to produce development of the axillary buds at the base of stem, as a very slight lesion on the side of the stem often suffices. Scores of such cases have been observed where the primary stem seemed still healthy. Furthermore, not only do the buds in the axils of the two cotyledons develop, but other adventitious shoots appear from the same region. These may either appear when the disease attacks the secondary shoots or at the same time as those from the axils of the cotyledons. Frequently as many as six shoots developed when the primary stem was injured. Fig. 1, *b*, shows three secondary stems; these, in turn were all killed by the fungus at the tip and a fourth shoot was just starting.

Sometimes considerable difficulty is experienced in obtaining good germination with peas for botany classes. In view of the failure to grow because of the blight fungus, as well as from other fungi and bacteria, it is suggested that all discolored peas be thrown out; that the soil be sterilized or a new or less organic soil be substituted; and that the soil should not be kept too wet. Seed treatment before planting by the use of heat or chemicals has proved a failure, since the fungus is *within* the pea seed and anything used as a fungicide kills the pea germ before it kills the fungus.

Ohio Agricultural Experiment Station,
Wooster, Ohio.

PROCEEDINGS OF THE CLUB

February 13, 1906

The meeting was called to order at the American Museum of Natural History by the secretary, at 8:30 o'clock. Owing to the absence of the president, Dr. N. L. Britton was called to the chair. Twenty-three persons were present.

After the minutes of January 31 were read and approved, the following names were presented for membership: Professor Geo. F. Atkinson, Cornell University, Ithaca, N. Y.; Frederick S. Beattie, Brown University, Providence, R. I.; F. M. Bruggerhof, P. O. Box 1449, N. Y. City; Mr. H. Dautun, 139 Franklin St., Jersey City, N. J.; Dr. Clayton D. Fretz, Sellersville, Pa.; Dr. William J. Gies, 437 West 59th St., N. Y. City; C. C. Hanmer, L. Box 96, East Hartford, Conn.; Mrs. Richard March Hoe, 11 East 71st St., N. Y. City; Lewis H. Lapham, 15 West 56th St., N. Y. City; Miss Sarah A. Robinson, 289 East Houston St., N. Y. City; Nelson Smith, 151 West 48th St., N. Y. City; Mason A. Stone, 244 Central Park West, N. Y. City; Mr. C. A. Weatherby, East Hartford, Conn.

A paper by Dr. Arthur M. Edwards, on the "Origin of the Bacillaria," was read by title.

On the vote of the Club, the secretary cast the ballot of the Club for the election to membership of the persons whose names were proposed for membership as above.

The paper of the evening was an illustrated lecture by Mr. George V. Nash, on the "General Botanical Features of Orchids."

There seems to be a general misconception among many as to just what an orchid is. Any plant which grows on a tree, or has some peculiar feature is, without hesitation, called an orchid. This mistake is frequently made in regard to the pitcher plants, *Nepenthes*, or to the tail-flowers, *Anthurium*. In order more clearly to define the structure of the orchid flower, a large flower of the genus *Cattleya* was illustrated on the screen. The uniting in one organ, called the *column*, of the stamens and pistils, serves at once to distinguish this family from all related ones. The

diandrous and monandrous forms of this column were described and illustrated with lantern slides, as were the other features of the family. The two kinds of pollinia were explained, that which develops appendages at the base, and that which is without appendages, or develops them at the apex, the former associated with the persistent anthers, the latter with the deciduous anther. Attention was called to the thickened stems of most orchids. In some the stem is very short and much enlarged. Such stems are known as *pseudobulbs*. *Oncidium* and *Odontoglossum* are examples of this sort. In others the entire stem is thickened, as is the case in *Cattleya* and *Dendrobium*. The lateral and terminal forms of inflorescence were described, the former arising from the base of the pseudobulb, the latter from the apex. The vernation of the leaves, whether convolute or conduplicate, was illustrated. The manner of growth, whether limited or unlimited, was indicated: the limited in such genera as *Epidendron*, *Oncidium*, *Odontoglossum*, *Masdevallia*, and in fact the greater part of the orchids; the other, the unlimited, in such genera as *Vanilla* and *Angraecum*, in which the axis ascends continuously.

The latest comprehensive treatment of this interesting family is by Pfitzer, in Engler and Prantl's *Natürlichen Pflanzenfamilien*. In his classification he utilized the characters and habits of growth referred to above.

The orchid family is a large one, embracing some 6,000 or 7,000 species, mostly distributed in tropical regions. Comparatively few are found in the warm temperate, and almost none in the cold portions of the temperate zone. The center of their distribution in the Old World is in India and the Malay region, such genera as *Dendrobium*, *Vanda*, and *Bulbophyllum* representing them in that region. In the New World they are found in the greatest numbers in Brazil and northern South America. Such genera as *Cattleya*, *Laelia*, and *Masdevallia* illustrate these. In the United States there are about 150 species, representing 44 genera. These are mainly terrestrial, the comparatively few epiphytes being confined to Florida and the Gulf States.

By far the greater part of the orchids grow in hot humid regions, where they are found most exclusively growing on trees,

or epiphytic. The terrestrial species in the tropics are relatively few. The epiphytes usually have thick fleshy leaves, and these and their thick stems serve as storage organs, for their water supply is precarious. While it is true that most orchids like humid conditions, this is not always the case. During an exploration of the Inaguas, which are extremely xerophytic, great masses of Epidendrons were found growing on the bases of the small shrubs or trees, or on the hot limestone rock ; and to emphasize this desert condition, was a species of *Agave* growing among them. They seemed to flourish, for the pseudobulbs were strong and vigorous.

Nearly all tropical orchids are epiphytic, while in temperate regions they are terrestrial, the soil around their roots protecting them from the extreme cold of winter. As a rule terrestrial orchids have thin leaves, for their water supply is not so limited as is the case with epiphytic orchids.

In distribution orchids are very local. Few genera are common to both the Old World and the New, and when they are common to both, the distribuion is a zonal one. The genus *Cypripedium*, as at one time understood, was a supposed exception to this. Recent authors, however, basing their conclusions upon well-defined structural differences in the flowers, have divided this, at one time cosmopolitan genus, into four genera, each of the four genera with a well-defined geographical distribution. We have now, instead of the one big genus, the following :

Selinipedium, New World, with 3 species, known only from Central America to Brazil.

Cypripedium, Old World and New, but zonal in distribution, with 28 species, north temperate.

Phragmipedium, Old World, with 11 species, in tropical America only.

Paphiopedilum, Old World, with 46 species, tropical Asia, Malaysia, Philippines, etc.

As genera typical of a zonal distribution, there were mentioned : *Cypripedium*, *Pogonia*, and *Limodorum*. Among the genera peculiar to the New World are : *Masdevallia*, *Pleurothallis*, *Epi-*

dendron, *Cattleya*, *Laelia*, *Lycaste*, *Maxillaria*, *Odontoglossum*, *Miltonia*, *Oncidium*, and *Dichaea*.

Among those confined to the Old World, are : *Thunia*, *Coelogyne*, *Pleione*, *Ansellia*, *Phajus*, *Dendrobium*, *Eria*, *Bulbophyllum*, *Cymbidium*, *Phalaenopsis*, *Vanda*, *Angraecum*, and *Aerides*.

The different features were illustrated with lantern slides, many of them colored. The latter were the work of Mrs. Van Brunt, and were kindly loaned for the occasion by her.

Alluding to Mr. Nash's discussion of the satisfactory breaking up of the old genus *Cypripedium* into four genera, and the restriction of *Cypripedium* to its type species and immediate relatives, having a well defined zonal distribution, Dr. Britton remarked upon the wide application of this principle in the progressive study of plants and animals, causing the recognition of very many more genera than were believed to exist by most botanical and zoölogical students in the last century.

The vastly greater number of species now known, and their more critical comparative study in the field and in collections, as well as the more exact understanding of long-recognized species, shows that the number of homogeneous groups which we call genera, existing in nature, is larger than previously supposed. The genus *Habenaria* has recently been subdivided into several genera, and this subdivision has been a distinct advance in the taxonomy of orchids.

The Club adjourned at 9:30 o'clock.

C. Stuart Gager,
Secretary.

February 28, 1906

The Club met at the Museum Building of the New York Botanical Garden, at 3:30 o'clock. Vice-President L. M. Underwood presided, and 21 persons were in attendance.

The minutes of February 13 were read and approved, and the following names presented for membership :

Richard H. Allen, Chatham, New Jersey ; Dr. T. J. W. Burgess, Montreal, Canada, Box 2381 ; H. Hapeman, Minden, Nebr. ; Miss Caroline Harriot, Whitestone, L. I. ; Dr. A. H. MacKay, Dartmouth, Nova Scotia ; S. Mendelson Meehan, Mt.

Airy, Philadelphia, Pa.; Lycurgus R. Moyer, Montevideo, Minn.; O. M. Oleson, Fort Dodge, Iowa; S. B. Parish, San Bernardino, Cal.; Chas. C. Van Loan, 407 West 47th St., N. Y. City; David R. Sumstine, 508 Elliott St., Wilkinsburg, Pa.; Charles Fay Wheeler, Prince George Co., Lanham. Md.

On a vote of the Club, the secretary cast the ballot of the club for the persons above proposed for membership.

The first paper on the scientific program was by Dr. W. A. Murrill, on "Remarks on a Destructive Disease of the Chestnut Trees."

The disease in question was discovered last summer, by Mr. H. W. Merckel in the New York Zoölogical Park, where most of the chestnut trees were found to be affected and many of them injured beyond hope of recovery. Besides being abundant about New York City, it is known to occur also in New Jersey, Maryland and Virginia and its presence is suspected in Georgia and Alabama.

The disease is apparently unknown to all our mycologists and the fungus appears to be undescribed. By cultures, inoculations and field studies, its morphology and life history have already been quite well determined; but no treatment beyond clean culture can as yet be suggested.

The paper was illustrated by specimens, photographs, drawings and cultures.

The second paper was entitled "*Crataegus* in Dutchess County, N. Y.," and was by W. W. Eggleston.

Many herbarium sheets were shown. The paper is published in the present issue of TORREYA. It was briefly discussed by Professor Underwood.

The last paper by Miss Alice A. Knox was entitled, "A Cucurbitaceous Stem of the Desert."

Ibervillea Sonorae, an American desert species of the Cucurbitaceae is noteworthy for its enormously thickened perennial stem, which frequently reaches a diameter of 40 cm. This stem can exist an indefinite time without water, sending up yearly long flexible shoots. Its anatomy shows in general the ordinary stem structure of Cucurbitaceous plants. There is a double ring of

bicollateral bundles, a ring of stereome, and collenchyma in the cortex. Peculiarities of its histology are the irregular number of bundles, the absence of interfascicular cambium, and the great breadth of the medullary rays. An active cambium is found within as well as without the hadrome regions. Scattered sieve-tubes occur in the periphery and an elaborate system of secretory canals adjoins the leptome regions ramifying also through pericycle and cortex. In the other stems supernumerary leptome bundles develop, often accompanied by pitted ducts which are cut off from the primary hadrome by the renewed activity of the wood parenchyma. A large periderm gradually forms, its cells finally encrusted with calcium carbonate.

It is difficult to trace the age of these tubers as the medullary rays are not formed yearly, but judging by the increase at the base of old shoots and by the development of young plants, they may sometimes be the product of half a century of growth.

The paper was illustrated by drawings and living specimens.

The paper was discussed by Dr. Rydberg, who mentioned the root characters, and geographical range of *Cucurbita foetidissima*.

C. Stuart Gager,
Secretary.

March 13, 1906

The Club met in the American Museum of Natural History at 8 P. M. President Rusby was in the chair and 13 persons were present.

After the minutes of the meeting of February 28, were read and approved the following names were presented for membership:

Mr. Ellsworth Bethel, 270 S. Marion St., Denver, Colo.; Mr. T. J. Fitzpatrick, Iowa City, Iowa (Box 497); Mrs. Sarah B. Hadley, South Canterbury, Conn.; Prof. John M. Holzinger, Winona, Minn.; Mr. Robert K. Miller, 111 and 113 Chamber of Commerce, Baltimore, Md.; Mr. Eugene A. Rau, Bethlehem, Pa.; Mr. Willard A. Stowell, 140 Kent St., Trenton, N. J.; Mr. C. F. Wheeler, U. S. Dept. of Agriculture, Washington, D. C.

President Rusby stated that owing to other duties he would be unable to represent the Club at the coming celebration of the

200th anniversary of the birth of Benjamin Franklin at Philadelphia.

Resignations from the Club were read and accepted from the following persons :

Mr. C. L. Allen, Floral Park, N. Y.; Miss Mary McOuat, 211 West 108th St., N. Y. City; Miss Madeline Pierce, New York Tribune, N. Y. City; Mrs. G. H. Robinson, 339 West 57th St., N. Y. City.

A communication was read from Mr. Ellsworth Bethel, of Denver, Colo., stating that he and Dr. Sturgis were at work on the fungi of Colorado, and would soon publish their first number, listing the Myxomycetes of the state.

President Rusby presented the matter of public recognition by the Club of the coming 10th anniversary of the establishment of the New York Botanical Garden, and the appointment of Dr. Britton as Director-in-Chief and of Professor Underwood as professor of botany in Columbia University.

Motion was made and seconded that a committee be appointed by the chair to make arrangements for such an event. The motion was carried, and the president appointed the following committee :

Miss Vail, Miss Marble, Dr. Murrill, Dr. Curtis, Professor Richards, Dr. MacDougal and Dr. Barnhart.

On motion the secretary cast the vote of the Club, electing to membership the persons whose names were presented as above.

The first paper on the scientific program was by Dr. P. A. Rydberg, entitled " Botanizing in Utah."

The substance of this paper appeared in the Journal of the New York Botanical Garden **6** : 158. 1905.

Many herbarium specimens were passed, illustrative of the paper.

The last paper was by Professor E. S. Burgess, on " Biotian Asters."

This was an informal discussion of the Biotian section of the genus *Aster*, accompanying the publication at this time of the author's monograph on the Biotian Asters (constituting Vol. 13 of the Torrey Club's Memoirs) with description and figures of 84

species and 10 subspecies, and with informal descriptions of about 250 less definite forms. The Biotian section of *Aster* is one of the most difficult and variable, and seems particularly active in production of new forms, some other sections of *Aster* being quite stable in comparison. Most of the larger and more conspicuous species, with violet or lavender rays and glandular hairs constitute as a subsection the *Macrophylli*, typified by the well-known *Aster macrophyllus* L. Specimens illustrating the principal species of this subsection were exhibited and compared, and the speaker described the results of his method of continued observation on plant-colonies in unchanged natural habitat, with reference especially to the development of variations, and to distinction between certain changes apparently due to environmental conditions and other changes suggesting origin by mutation.

NEWS ITEMS

Dr. P. A. Rydberg, of the New York Botanical Garden staff, has been devoting three weeks to studies in the United States National Herbarium.

Dr. C. F. Millspaugh, curator of the botanical department of the Field Columbian Museum, Chicago, sailed for Europe in the latter part of March.

Dr. David Griffiths, of the Bureau of Plant Industry, is spending two months in grass and forage-plant investigations in Texas, New Mexico, Arizona, and California.

Fred William Foxworthy (Ph.D., Cornell, 1904) and Albert Francis Blakeslee (Ph.D., Harvard, 1904) have recently been appointed to botanical positions in the service of the Philippine government.

Mr. William R. Maxon, of the United States National Herbarium, sailed from New York on March 31, to spend two months in making botanical collections in Costa Rica in behalf of the New York Botanical Garden.

Dr. Duncan S. Johnson, associate professor of botany in Johns Hopkins University, sailed for Jamaica on April 5 with the intention of devoting two months to studies at the tropical laboratory of the New York Botanical Garden at Cinchona.

Miss Jean Broadhurst (B.S., Columbia, 1903), recently of the New Jersey State Normal and Model Schools, has been appointed instructor in biology and nature-study in the Teachers College, Columbia University, where she will have charge of most of the courses recently given by Professor Francis E. Lloyd.

The *Brown Daily Herald* of March 12 states that Professor William Whitman Bailey will retire from the faculty of Brown University at the close of the present academic year. He has been a teacher in the University for nearly twenty-eight years, during twenty-five of which he has been professor of botany.

The sixth annual session of the Minnesota Seaside Station, located on the Straits of San Juan de Fuca, near Port Renfrew, British Columbia, will extend from July 8 to August 18. The botanical courses will be given by Professors Conway MacMillan, Josephine E. Tilden, Fred. K. Butters, and C. Otto Rosendahl, of the University of Minnesota.

Mr. Harlan H. York, fellow in botany in Columbia University, is acting as a special assistant in the United States National Herbarium for three months beginning April 1. During the summer he will assist in the instruction in cryptogamic botany in the biological laboratory of the Brooklyn Institute of Arts and Sciences at Cold Spring Harbor, Long Island.

We learn from the *Botanical Gazette* for March that Dr. Albert Schneider has resigned the professorship of botany, pharmacognosy, and materia medica in the California College of Pharmacy, to accept the position of pathologist and physiologist of the Spreckels Sugar Company and that he is devoting his entire time at present to the investigation of the so-called California sugar-beet blight.

Dr. Lester F. Ward, who has been paleontologist of the United States Geological Survey since 1881, and is author of the well-

known "Guide to the Flora of Washington and Vicinity," in addition to numerous important paleobotanical papers, has, according to a recent statement in *Science*, been elected professor of sociology in Brown University and will begin his new duties in September.

Dr. D. T. MacDougal, director of the department of botanical research of the Carnegie Institution of Washington, who has been spending the winter at the Desert Botanical Laboratory at Tucson, Arizona, came east early in April to attend the Franklin bicentenary in Philadelphia. During June, July, and August, he will be occupied with his mutant-cultures at the New York Botanical Garden.

The summer session of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, located at Cold Spring Harbor, Long Island, will begin on July 5 and continue for six weeks. Dr. D. S. Johnson of Johns Hopkins University remains in charge of the instruction in cryptogamic botany and will be assisted by Mr. Harlan H. York, of Columbia University. Dr. E. N. Transeau, of Alma College, Michigan, will give instruction in plant ecology.

Professor Hugo de Vries, of Amsterdam, arrived in New York on April 10. He gave an address in Philadelphia, April 18, on "Elementary Species in Agriculture" in connection with the celebration of the two hundredth anniversary of the birth of Benjamin Franklin, and on April 21 lectured at the New York Botanical Garden on "The Correlation of Characters in Plants." He will visit various institutions where experiments in plant mutation are being carried on and in June and July will deliver a course of botanical lectures at the summer session of the University of California.

The New York Botanical Garden collecting expedition, headed by Dr. Britton and referred to in the last number of TORREYA, returned to New York on April 1. Dr. Britton and Dr. Howe, accompanied by Professor William Morton Wheeler of the American Museum of Natural History, spent ten days in the early

part of March on the island of Culebra, where the facilities of the United States Naval Station were placed at their disposal. Afterward, they joined the other members of the party, consisting of Mrs. Britton, Miss Delia W. Marble, and Mr. John F. Cowell, for a trip through the mountains of the interior of Porto Rico. The dried specimens of plants secured by the expedition are represented by about 1,700 field numbers, in addition to a large amount of living material for the conservatories.

The program of the spring course of Saturday afternoon lectures at the New York Botanical Garden is as follows:

April 21. "On the Correlation of Characters in Plants," by Professor Hugo de Vries.

April 28. "A Day at Hammarby, the Home of Linnaeus," by Dr. W. A. Murrill.

May 5. "A Historical Review of the Study of Fossil Plants," by Arthur Hollick.

May 12. "A Glimpse at the Development of Botany in America," by Professor L. M. Underwood.

May 19. "The Effects of Radium on Plants," by Dr. C. S. Gager.

May 26. "Some Botanical Features of Porto Rico," by Dr. Marshall A. Howe.

June 2. "Orchids; Their Botanical Features and Relation to Horticulture," by Mr. Geo. V. Nash.

June 9. "The Wild Vegetable Foods of the United States," by Dr. H. H. Rusby.

June 16. "The Origin and Adaptations of Desert Floras," by Dr. D. T. MacDougal.

June 23. "The Botanical Exploration of the West Indies," by Dr. N. L. Britton.

The lectures will be illustrated by lantern-slides and otherwise and will begin at 4:30 P. M. Before the lectures, opportunity will be given for inspection of conservatories, museums, library, herbarium, herbaceous garden, hemlock forest, and other parts of the grounds. The garden is reached by the Harlem Division of the New York Central Railway to Bronx Park Station, or by the Third Avenue Elevated Railway to Bronx Park.

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TORREYA

May, 1906

A COLLECTING TRIP AT CINCHONA

By Forrest Shreve

The Tropical Station of the New York Botanical Garden at Cinchona, Jamaica, is located in a region which is not strictly tropical, owing to its being at an altitude of 5,000 feet. Far from being a fact to be deplored, this circumstance redounds, in at least two ways, to the advantage of the visiting botanist. After spending six months here I can say that I have not been ill a single day, nor have I experienced the feeling of lassitude proverbial to the tropics. The other advantage is that from here there is readily accessible a great number of regions which are strikingly diverse in flora, owing to differences in altitude, rainfall and topography.

A spot which I visited recently proved to be of more than common interest, and I feel impelled to give an account of it in order that those who come here in the future may not miss going there. Leaving Cinchona and crossing the main ridge of the Blue Mountains at Morce's Gap, a ride of some three hours in a northerly direction brings one to Vinegar Hill, a locality at an elevation of about 3,900 feet, from which a commanding view may be had of the coast and sea to the north, and of the billowy expanse of hills to the east and west. To the southwest of Vinegar Hill stands John Crow Peak (6,000 feet), the most westerly elevation of the Blue Mountain Range. Between it and Vinegar Hill lies a large valley drained by the Mabess River, better known as the west branch of the Spanish River, which debouches near Orange Bay. Throughout the upper portion of this valley there is an unbroken stretch of virgin forest. In such a region one might search in vain for any of those introduced plants which

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play so important a part in making up the aspect of Jamaican vegetation elsewhere in the island — the cocoanut palm, the mango, the banana, the bamboo, etc. Indeed, in the absence of these plants the landscape is comparatively tame and monotonous.

The number of white men who have traversed this valley may be counted on one's fingers, and the only path in it is the ill-defined trail by which we will now make our way down to the river. The descent, at first steep, soon becomes precipitous, and now walking, now sliding, clutching blindly for support at the spiny trunks of tree-ferns, we soon reach the river. Standing at the edge of the stream we find ourselves amid surroundings of indescribable beauty. The "river" is not large, but is studded with innumerable boulders, by which it is broken into a continuous series of waterfalls and pools. Above it a closed arch is formed by the limbs of the trees, festooned with golden-brown moss or the tangles of lianes, and in the quiet pools are reflected the giant flowers of *Datura Tatula.*

The forest trees are a marked contrast to the stunted forms which cover the higher slopes of the Blue Mountains; here *Symphonia globulifera* (the hog plum) reaches a height of 100 feet, and *Calophyllum Calaba* (the Santa Maria tree) spreads its canopy of large glossy leaves to an equal height. Down at the coast the temperature is higher than here, and further up the valley the precipitation is greater, but at just this elevation there is the maximum combined effect of these two most potent forces in determining the wealth and luxuriance of vegetation. The tropical aspect of the forest is heightened by the presence of occasional individuals of the long-thatch palm (*Geonoma Swartzii*), by the banana-like *Heliconia Bihai*, as well as by species of *Canna* and *Philodendron* and the numerous shrubby and arborescent Melastomaceae and Rubiaceae, which make up the undergrowth. The epiphytic vegetation is exceedingly rich, having a groundwork of various mosses and being made up of the less xerophilous types of ferns, orchids, Piperaceae and Gesneraceae. The dense foliage of the tree-crowns renders the Bromeliaceae much less common than in the open canopy of the forest on the higher

slopes and in the xerophilous leguminous trees in the dry regions along the south coast of Jamaica. The tender *Pilea radicans* covers the limbs of the shrubs to a height of 20 feet. *Trichomanes pyxidiferum* and *T. muscoides* clothe the lower portions of many trunks and *Polypodium phyllitidis* and *P. serpens* climb over the higher parts.

The terrestrial herbaceous vegetation is extremely rich in spite of the density of the shade. It is made up chiefly of ferns, yet one will not fail to find many species of *Pilea* and *Peperomia* and several orchids ; among the last, two forms with leaves possessing velvet surfaces, a characteristic developed only in the foliage of the most moist regions of the globe. Another feature which marks regions of high humidity is the occurrence of epiphyllous growth, and here it could not fail to arrest the attention of the most casual observer. Scarcely a leaf of the undergrowth is without a colony of hepatics and some large fronds of *Danaea* and *Acrostichum* are so completely covered as to leave no room for the lodging of another gemma. Among the interesting ferns which may be gathered here are *Vittaria lineata*, *V. remota*, *Aspidium Fadyenii*, *Danaea jamaicensis*, *Davallia cicutarioides*, *Gymnopteris aliena* and *Rhipidopteris peltata*. The last-named of these resembles *Lycopodium complanatum* more closely than it does any other fern. Many boulders in the river are covered by unbroken masses of it, with here and there a fertile frond — simple, reniform, and on its dorsal surface completely covered by the black sporangia. Hanging from the trees, and rather rare, is the long flaccid *Lycopodium taxifolium*, and the still more rare *Psilotum complanatum* has been found near by. Among the epiphytic orchids may be found *Liparis elata* — which grows as often upon the ground — *Masdevallia fenestrata*, *Epidendrum fragrans* — not common in this part of Jamaica — *Epidendrum bletioides*, *Comparettia falcata* and the tiny *Pleurothallis tribuloides*. The commoner *Epidendrum polybulbon* climbs over the limbs of trees in company with *Peperomia cordifolia*, the older leaves of which have a thick mass of water-storing tissue above the chlorenchyma.

Time does not suffice to make a very thorough search of the locality — the ascent must be begun in order to reach home by

night-fall. While toiling upward one has more time to examine the vegetation of the valley slopes. A striking shrub is *Cephaëlis punicea*, a Rubiaceous plant with large showy red bracts and extremely thin leaves, which are so stiffened by an epidermis which forms nearly half the thickness of the leaf that on being struck with the finger they emit a metallic sound like that from a piece of tin. Other noticeable shrubs are *Hoffmannia pedunculata*, the trailing *Schradera cephalotes* and *Clidemia plumosa*, with large densely hairy leaves. The root-parasite *Scybalium jamaicense* is fairly common along the trail, pushing its stout club-shaped inflorescences above ground, its dark rich-red color being in striking contrast to all the other tones of the surroundings. Careful search will discover scattered colonies of *Burmannia*, a saprophytic plant of the same pure white as *Monotropa* but much more slender. The rare *Apteria*, of similar habit, has also been found here. *Marattia alata*, *Lygodium volubile*, *Gleichenia furcata*, *Cyathea arborea* as well as species of *Botrychium*, *Davallia*, *Danaea*, *Trichomanes*, *Hymenophyllum*, *Elaphoglossum* and *Lomaria* offer a wide range of examples of ferns of interest because of their morphological importance. Among the trees may be seen many species characteristic of higher altitudes, as the coniferous *Podocarpus Urbanii*, *Vaccinium meridionale*, *Alchornea latifolia*, *Guarea trichilioides* and *Laplacea Haematoxylon*, a member of the tea family with splendid white, rose-like flowers.

As we near the end of the ascent our minds begin to wander from the plant life to an estimation of the remaining distance, and at length it is with pleasure that we reach the road and the waiting ponies. There are a score of just such valleys as this between Vinegar Hill and Cuna Cuna Pass, but they are very inaccessible both from above and below. The strongly endemic character of the Jamaican flora and the very limited distribution of many species would indicate that the first botanist who has the privilege of visiting these places will undoubtedly find awaiting him many forms which are new to science.

Cinchona, Jamaica.

CHLORONYMS

By John Hendley Barnhart

Under the caption "An unwritten law of nomenclature," in a recent issue of his *Leaflets of botanical observation and criticism*,* Professor Greene has protested strongly against what he is pleased to call "the newly introduced usage of naming two or three different genera of plants in honor — dishonor, it should be said — of one and the same man, and doing it deliberately." We may safely disregard Professor Greene's provision that the act be committed deliberately, for it is hazardous to attempt the interpretation of unexpressed motives underlying publication, and he shows by his further remarks that when two or more names have been dedicated to the same person he regards the first name only as valid, even if the duplication were unintentional.

Now one might suppose, at first sight, that Professor Greene's protest was actually aimed against the flood of names like *Neowashingtonia*, *Englerella*, *Stapfiola*, *Philippiamra*, *Saccardophytum*, *Faxonanthus*, *Brittonastrum*, *Pringleochloa*, and *Greeneocharis*, so much in evidence during recent years. It must be admitted that names of this class represent a "newly introduced usage," a distinctly modern invention of questionable value ; and if Professor Greene had protested against these verbal monstrosities upon purely linguistic grounds (as the first part of his discussion would lead us to expect) doubtless he would have found some sympathizers. But he does not object to these names upon the ground of their form, for he expressly states that he considers *Brittonamra* valid, and he has himself proposed the name *Neobeckia*, which remains valid as far as his present criticisms are concerned.

Instead of the usage of dedicating two or more genera to one and the same man being "newly introduced," it has been known for more than a hundred years, and the only reason why cases of the kind are not more numerous in the earlier literature is that there were so few persons (mostly Frenchmen) whose names lent themselves readily to such a practice ; the modern *neo-ella-astrum-anthus* method of multiplying names being at that time unknown.

* 1 : 201. 10 Ap 1906.

The most astonishing statement in Professor Greene's paper is that the earliest case known to him of the deliberate naming of a second genus for one man was in 1850, when Kunth proposed *Wittia* for the later of the two genera previously named *Clintonia.* Further than this, and as if to emphasize it, he says that while there may be earlier cases, he thinks not. This assertion, if permitted to go unchallenged, coming as it does from a botanist who is reputed to possess an unusual degree of familiarity with the history of botanical names, would naturally be accepted as authoritative by the casual reader.

A precisely similar case, however, occurred twenty-five years earlier. *Esenbeckia* H.B.K. (1825) and *Esenbeckia* Blume (1825) were dedicated independently to the brothers Nees von Esenbeck. Blume, discovering that his name was a homonym, changed it to *Neesia* (1828); thus *Esenbeckia* H.B.K. and *Neesia* Blume have come down to us side by side until the present day, both of them universally recognized as valid genera. *Neesia,* however, according to the newly discovered unwritten law, is not valid; it is surely not a "homonym" of *Esenbeckia*, and as the discoverer of this law has not given us any word by which to characterize such a name, perhaps we may be permitted to call it a "chloronym." This word is so appropriate that it would be superfluous to explain its derivation. It happens that *Neesia* Blume (1828), besides being a chloronym of *Esenbeckia* H.B.K. (1825), is a homonym of *Neesia* Spreng. (1818); and *Esenbeckia* H.B.K. (1825) is also a chloronym of this earlier *Neesia;* and finally, this first *Neesia* being a synonym of an earlier name, by this bit of jugglery both of the time-honored names *Neesia* and *Esenbeckia* disappear from view forever!

A few other chloronyms, earlier than the one cited by Professor Greene as the first, may be mentioned here, the names of the genera being preceded by the names of the persons to whom they were dedicated.

1. RÉNÉ LOUICHE DESFONTAINES. *Louichea* L'Her. 1789. — *Fontanesia* Labill. 1791. — *Desfontainea* R. & P. 1794. (It may be worth mentioning that this last name was altered to *Linkia* by Persoon, in 1805, because of *Fontanesia*, but this emendation was rejected by nearly all of his contemporaries.)

2. Jean Baptiste Monet de LaMarck. *Monetia* L'Her. 1784. — *Markea* Rich. 1792. — *Lamarkia* Moench, 1794.

3. Napoleon Bonaparte. *Bonapartea* R. & P. 1802. — *Napoleona* Beauv. 1807.

4. Aubert Aubert du Petit-Thouars. *Aubertia* Bory, 1804. — *Thuarea* Pers. 1805.

5. Jules Dumont d'Urville. *Urvillea* H.B.K. 1821. — *Durvillaea* Bory, 1826.

6. Constantine Samuel Rafinesque-Schmaltz. *Schmaltzia* Desv. 1813. — *Rafinesquia* Nutt. 1841 (and several earlier genera "*Rafinesquia* Raf.").

Now it is not to be supposed that this exhausts the list, but most of the names here mentioned have received practically universal recognition, and are to be found, accepted without question, in such works as those of DeCandolle, of Bentham & Hooker, and of Engler & Prantl. Some of the above-mentioned chloronyms, in fact, if deprived of their validity under this "unwritten law," leave their respective genera nameless; such are *Desfontainea* (*Linkia* Pers. being a homonym of *Linkia* Cav.), *Napoleona* and *Durvillaea*. Surely it is Professor Greene's solemn duty to propose tenable names for these genera.

Modern chloronyms, as everyone realizes, are very abundant, and in practically every case they are without available synonyms; it is to be hoped, of course, that Professor Greene will increase the burden of synonymy (for that is all it is likely to amount to) by furnishing names wholly unexceptionable in form and derivation. For instance, twenty years ago there was no genus dedicated to Professor Adolf Engler, of Berlin; now, besides the first, *Engleria* O. Hoffm. (1889), there are the following chloronyms, awaiting substitutes from which Engler's name has been eliminated: *Englerella* Pierre (1891), *Englerophoenix* Kuntze (1891), *Englerastrum* Briquet (1894), *Englerodaphne* Gilg (1894), and *Englerina* Van Tieghem (1895). Surely there is a broad field opening for Professor Greene's activities.

After all, one of the greatest difficulties attending the application of the "unwritten law" lies in the fact that derivation, not form, must be the factor determining whether a given name is

a true chloronym or not. For instance, *Parryella* A. Gray (1868), named for Dr. C. C. Parry, is not a chloronym of *Parrya* R. Br. (1824), named for Capt. W. E. Parry; and *Pringleophytum* A. Gray (1885), named for Mr. C. G. Pringle, is not a chloronym of *Pringlea* Anders. (1845), named for Sir John Pringle. As there is no law compelling an author who proposes a new generic name to give the derivation of that name, it is often a matter of mere guess-work whether two names which might be of the same derivation are actually so. Perhaps Professor Greene has some means of determining facts like these.

PLEISTOCENE PLANTS FROM VIRGINIA

By Edward W. Berry

The investigation of American Pleistocene floras stands in striking contrast to the splendid results of European research, due mainly to more intensive methods of collecting and study there pursued. Aside from the work of Penhallow and a few scattered papers by Lesquereux, Knowlton and others, practically nothing has been done in this country. While leaf-impressions may not be common in the Pleistocene clays, careful search of swamp deposits by a sort of placer-mining process is almost sure to yield an interesting collection of seeds many of which are readily identifiable.

The material upon which the following notes are based consisted of a small quantity, perhaps a pound in all, of hard lignite collected by Dr. B. L. Miller, of Bryn Mawr College, and deposited in the collections of the Johns Hopkins University. It was collected at Tappahannock on the Rappahannock River, Virginia, and is from the Talbot formation, the latest Pleistocene formation recognized.

Fagus americana Sweet.

Fagus ferruginea Michx. Lesq. Am. Jour. Sci. **27**: 363. 1859. Geol. Tenn. 427. *pl. K. f. 11.* 1869.—Knowlton, Am. Geol. **18**: 371. 1896.

Nuts indistinguishable from those of the American beech are occasionally present. They are somewhat distorted, although

a few are perfect except for being somewhat flattened by pressure. While the beech is decidedly a later Tertiary type, remains have been found as far back as the mid-Cretaceous, both in this country and Europe. It has been detected also in the Pliocene of Europe and Japan, and the present species occurs in the Pleistocene (?) at Somerville, Fayette County, Tenn., and in the glacial at Morgantown, West Virginia. While over a score of fossil species are known, the existing flora contains but four, the American, the European, and two from Japan, evidently the surviving descendants of a once dominant and widespread genus.

VITIS sp.

A single grape-seed was found, showing the characteristic raphe. I have not ventured, however, to identify it specifically. Among the fragments of bark and stems of which the lignite largely consists are a number of stems that have every appearance of belonging to the vine. Grapes are first recorded from the uppermost Cretaceous, becoming abundant in the Miocene. The European Tertiary has furnished two Pliocene and two Pleistocene forms, but none has been recorded, so far as I know, from the American Pleistocene.

HICORIA GLABRA (Mill.) Britton.

Remains consist of one perfect specimen of the nut and several fragments. Shells are worn and do not show angles. While small for this species, 13 mm. in diameter, they have the characteristic very thick shell. This is the first recorded fossil occurrence of the pig nut, although the pecan has been found in the Pleistocene of Kentucky and the shagbark in that of Canada. The genus appears doubtfully in the upper Cretaceous and is one of the dominant Tertiary types.

TAXODIUM DISTICHUM (L.) Rich.

Cone-scales of this species are common, a dozen being found in the small amount of material examined. This was to be expected from the frequent occurrence of stumps in the Pleistocene. The genus appears in the upper Cretaceous and is one of the abundant conifers of the Miocene.

Nyssa biflora Walt.

A single seed belonging to this species was found. The genus appears in the mid-Cretaceous and becomes abundant in the late Tertiary, the fruits being very common in the lignites of Brandon, Vermont, from which Perkins has recorded no less than seventeen distinct species.

None of the foregoing species furnishes any very definite data in regard to the climate of Talbot times, all being wide-ranging forms in the existing flora. Thus the beech ranges from Nova Scotia to Florida, as do some species of grape. The pignut hickory ranges from Maine to Florida and Texas; the cypress from Delaware to Florida, and the black gum from New Jersey to Florida and Louisiana.

Judging from the range as above given, we would not expect the climate of this river swamp in Virginia to have been colder than obtains in like surroundings in New Jersey at the present day. Temperatures were probably higher, as they were undoubtedly more uniform than in the adjacent uplands, the species all indicating a low, close stand of timber, the gum and cypress being characteristic swamp forms, the vine a lover of low thickets, the beech and pignut, especially the former, also preferring deep, damp woods.

Maryland Geological Survey,
Johns Hopkins University.

REVIEWS

Burgess's Species and Variations of Biotian Asters *

Here is a notable work notably performed, and one which responds in full measure to a long insistent need. Of all the larger groups of flowering plants in our eastern flora not another one, perhaps, now that enlightenment has dawned in the realms of hawthorn and of violet, has so pressed upon the student its need of re-interpretation as the asters — plants full of allurement and delight to the hopeful beginner, to the systematist recondite

* Burgess, Edward Sandford. Studies in the History and Variations of Asters. Part II. Species and Variations of Biotian Asters with Discussion of Variability in Aster. Mem. Torrey Club 13: i–xv + 1–419. *f. 1–108.* 15 Mr 1906. Price $3.00.

and intractable in almost hopeless degree. Doctor Gray's prolonged struggle with the genus gave a result which met the reasonable needs of a generation of botanists and disturbed not their peace of mind. But even Doctor Gray here bowed before his task. To a friend he wrote "If you hear of my breaking down utterly and being sent to an asylum you may lay it to Aster." To such a group of plants has Professor Burgess addressed himself, or, more properly, begun to address himself, in this preliminary volume of 419 pages wherein the two species forming the section Biotia of Doctor Gray's treatment are expanded to 81 species, 10 named varieties and about 250 lesser forms. Professor Burgess tells us that his investigations which have led to these results commenced twenty years ago and that the conclusions reached rest in part on field studies continued on the same colonies of plants over periods of as much as seven to ten years. No fault of hastiness, therefore, can be imputed to these conclusions; and in the general reasoning which leads up to them we have the judgments of a mind long trained as well in outdoors as in indoors botany on many of the questions stirring the present foreground of botanical discussion.

It is plain in these pages that the author has felt less the motive of completing a monograph than an impelling need, as a student, of rightly understanding, step by step, the objects of his study. A work so completed must perforce carry weight; an upheaval so destructive of long-established tenets, whether its refashioning be right or wrong, will offer to criticism a ready opportunity. The reproach of "species making" follows close upon an author who proposes any refinement of the grosser conceptions of a species which time has imbedded in our text-books and bedecked with a historical aureole. And yet, but for these same "species makers" what misguidance, what untruthfulness would crowd the pages of our manuals?

Here, in *Aster*, that old Biotian pair, *Aster macrophyllus* and *Aster corymbosus*, have stumbled along down the annals of our flora somehow upholding honored names but only to be at length revealed as gross masqueraders after all.

Professor Burgess is not at all subservient to any conventional

standard of what should be the badge and token of a species. What he conceives to be worthy of this mark is to him full of reality and distinction. And intermediate specimens, or a certain proportion of intermediates, are not allowed to break down what nature has built up with notable architecture if not always with assured security. He is unterrified by variations, undaunted by numbers of forms. If nature directs the way that way must be followed notwithstanding a lion in every path. Doctor Gray, it appears, took many a short cut, but did not altogether escape the lions after all. And it is not to be supposed that the later author has come off without scratch or scar. A critic unfamiliar with the subject matter of this treatment might charge the author with having missed the highways in the byways. But this, we are convinced, cannot at all truthfully be said. Neither can it be said that his cartography is in all respects so true that the traveler may not too confidently always consult his guideposts. The future can alone determine this. Here it may be said that the substantial soundness of the work we expect the future to confirm.

Species, varieties, forms are indeed crowded upon these pages at the risk or with the certainty of bewildering the superficial student; yet nature herself is bewildering, and are not nature's facts more to be regarded than that taxonomic jugglery which would make the outlines of these facts either by elision or by emphasis falsely legible to the inquiring mind? And these lesser forms, although insisted on, are not mantled with any great dignity of taxonomic import. They are fixed only by a loosely fitting English name and may be taken or left by the student as the tenor of his mind may guide.

And as for these new species, what of them? What of species in general? Are we to lose them altogether in some wide-sweeping and misty conception of the instability of all organic forms? Some modern utterances seem almost to bear this meaning. Some taxonomic work would seem to mark the discovery of a mysterious species-solvent capable of reducing the subject matter of genera into veritable mushes of abstraction. In the method of this new aster book we welcome an emphatic protest against such robbery of nature.

Species, whatever they may be or may not be, press themselves before us with some invincible individuality which is their sufficient proof. Imprisoned in definitions, shackled by authority, ridiculed, nevertheless, by due process of time, the repression falls aside. So we have seen in many an instance, so we see here.

And if in the ultimate reach of our philosophy its teaching should be that these species in their varied and varying forms exist by reason of an infinity which lies back of nature, which nature is ever seething to express, then may we wisely restrain our too ready disbelief in the numbers of species which a genus may spread before us.

But the individual, the final unit, having likewise its manifold forms of expression, a double complexity enters into the taxonomic problem which, in large groups of closely related forms no single study of a single mind can be expected wholly to resolve. In this treatment of *Aster* it is fully possible that the species-net has in cases been too finely meshed to capture much more than the individual, and while we doubt not that many species of the group yet remain to be added, some now admitted may have to be withdrawn.

Some of these studies have had much to do with selected colonies of plants. The consistent behavior and organic distinction of such colonies viewed at close range might easily lead the systematist astray. As evidence of true specific segregation they may indeed be wholly deceptive. It is not difficult to conceive that such an assemblage might be founded from a single aberrant individual by a process of undisturbed inter-breeding by which the aberrency had been established in the enlarging colony. This is variation protected by isolation, and the evidence of possibilities rather than of fixed results. Should the process of expansion early eliminate the factor of isolation the features of the localized colony should readily pass back into the parent type.

Here, if anywhere, the test of a mature species must be found — the non-transformability of its individuals or their immediate generations under any conditions of environment into the next most nearly related form of accredited specific rank. Intermediate forms, however, are not necessarily by any means to be taken

as establishing such transformation. The current ruling, more especially in vertebrate zoölogy, which, in view of such intermediates reduces to subspecies widely diverse organic forms may well be suspected of being artificial and of attaching a fictitious importance to the mere evidences of origin which chance, perhaps, has allowed to remain unobliterated. Some fault of logic surely enters into a doctrine by which living types possessing organic values of high distinction in their class are reduced to relatively low taxonomic rank. A study such as the one before us, by its conscientious method, its open-mindedness, its enlightening results is a telling protest against the conventional, the artificial, the easy in taxonomic work.

Illustrations are indispensable to these pages and are well and effectively supplied. The unshaded heliotype plates, mostly of entire plants, are delicately true and bear touched into their outlines something indefinable which recalls instantly the individuality of the living plant. The many cuts scattered through the context are mostly by the author's own hand and add a guiding value which well justifies the evident care in bringing out essential points which has been bestowed on them.

The student of *Aster* may now take courage. It is the promise of this volume that the old hopeless search for real asters among those ghosts and figments of systematic botany — inclusive species — may presently remain to us only a doleful memory.

E. P. Bicknell.

Winton's Microscopy of Vegetable Foods*

The author prefaces his work with a brief discussion of the apparatus, reagents, preparation of material for examination, and the histology and morphology of vegetable organs. The discussion in which the reader is especially interested is divided into nine parts as follows: 1. Grain: its products and impurities. 2. Oil seed and oil cakes. 3. Legumes. 4. Nuts. 5. Fruits and fruit products. 6. Vegetables. 7. Alkaloidal products and their substitutes. 8. Spices and condiments. 9. Commercial starches. The work contains a glossary and index.

* Winton, A. L. The Microscopy of Vegetable Foods, with special reference to the detection of adulteration and the diagnosis of mixtures. 8vo. i–xvi + 1–701. *f. 1–589.* New York, John Wiley & Sons. 1906. Price $7.50.

The remarks on plant morphology, as well as the explanation of some of the terms in the glossary, will appeal to the botanist as requiring further consideration. The main part of the work merits the highest praise for the thoroughness with which this wide field has been considered, and for the scientific accuracy with which the various subjects have been treated. A vast amount of material has been compiled in a very concise form and arranged in a systematic order, so that it is available for ready reference to anyone who has occasion to make analyses of the foods of man and cattle. The value of the work is materially enhanced by a general bibliography, supplemented by a reference list of authorities on various special groups of foods.

Each part of the book contains a brief account of the various plants or organs used for food, the form in which the food is used and a detailed study of the structure and character of the tissues yielding the foods or of the admixtures and impurities. The characteristics of the substances that are of diagnostic value are fully illustrated by an extensive series of drawings. Special methods for the examination of certain groups are introduced in several instances as well as keys for the identification of various foods and adulterations as in the case of the grains, oil seeds and legumes.

This discussion of the sources of foods will appeal strongly to people who are not familiar with the subject as well as to the specialist. Probably there are few subjects so intimately related to our welfare with which we are so vaguely acquainted. For the same reason the extent and nature of the admixtures will be a matter of surprise, also the kind and parts of plants utilized for this purpose.

It is a very remarkable fact, considering the amount of work that has been done, especially in Germany and France, that heretofore no work has appeared in English devoted exclusively to the microscopy of foods. This text that has finally appeared is closely affiliated with Professor Moeller's work on food analysis which recently appeared with the collaboration of the author. Mr. Winton has, however, introduced a great amount of material into the present volume relating especially to America, and has

brought out a comprehensive treatise that will be widely welcomed and appreciated.

CARLTON C. CURTIS.

PROCEEDINGS OF THE CLUB

MARCH 28, 1906

The Club met at the Museum Building of the New York Botanical Garden, at 3:30 P. M. In the absence of President Rusby, Dr. C. C. Curtis was called to the chair.

Thirteen persons were present.

After the reading and approval of the minutes of the preceding meeting the following names were proposed for membership:

Mr. Alfred Cuthbert, Augusta, Ga.; Mr. S. M. Tracy, Biloxi, Miss.; Mrs. J. Newlin Trainer, 311 West 111th Street, New York City.

On behalf of the committee appointed at the last meeting to arrange for a celebration of the tenth anniversary of the establishment of the New York Botanical Garden, Dr. W. A. Murrill reported progress and briefly outlined the nature of the proposed celebration.

Professor Underwood was delegated to represent the Club at Philadelphia in April at the coming bi-centennial of the birth of Benjamin Franklin, in place of President Rusby, who resigned at the preceding meeting.

A communication was read from Dr. N. L. Britton, as secretary of the Council of the Scientific Alliance, outlining the proposition to bring about a closer relationship between the special scientific societies composing the Scientific Alliance with the New York Academy of Sciences. It was urged that at least two of the delegates of the Club be present at a meeting of the Council of the Scientific Alliance to discuss this topic further. This meeting will be held some time in April, 1906, the exact date to be announced later.

Dr. W. A. Murrill proposed the following amendment to the constitution:

"The number of honorary members of the Club shall not exceed ten, at any one time, and all restrictions as to qualifications shall be removed, except eminence in profession."

Dr. J. K. Small presented the first paper on the scientific program, on "Additions to the Flora of Florida." Specimens of the surface soil and subsoil, herbarium and alcoholic specimens, maps and photographs illustrated the paper.

The second paper was by Dr. J. H. Barnhart, on "The Dating of Botanical Publications."

Dates of issue of publications have been of more or less interest to bibliographers, but modern biological nomenclature, with priority of publication as one of its fundamental principles, has emphasized to a marked degree the importance of determining accurately the exact time when novelties are placed before the scientific public.

The novice usually accepts without question the date printed on a title-page. Soon, however, he discovers a book with a clear, definite, unmistakable reference to one bearing a later date — perhaps a year or two, possibly many years. Here, then, he has evidence, amounting to convincing proof, that at least one of the books he has been consulting is incorrectly dated ; but he may find it difficult to determine which is wrong, and still more difficult to replace the erroneous date by the correct one. Few even of experienced botanists realize what a large percentage of the literature of our science is labeled with misleading dates.

The purpose of the paper was to call attention to some of the causes of this state of affairs, to furnish examples of various classes of erroneous dating, and to mention certain precautions the observance of which will reduce the percentage of errors in the citation of dates.

Many publications were shown to illustrate the paper.

C. Stuart Gager,
Secretary.

April 10, 1906

The meeting of April 10, 1906, was held at the American Museum of Natural History, with President Rusby in the chair. Ten persons were present.

After the minutes of the previous meeting were read and approved, Dr. Murrill presented a report of progress from the com-

mittee on arrangements for the celebration of the tenth anniversary of the commencement of work in the development of the New York Botanical Garden.

President Rusby, in the absence of the chairman of the field committee, briefly outlined the program for the spring excursions. Dr. D. T. MacDougal was appointed by the president as second representative of the Club at the coming celebration, at Philadelphia, of the birth of Benjamin Franklin.

Mr. Percy Wilson was appointed chairman of the field committee in place of Mr. Eugene Smith, resigned.

The Honorable Addison Brown was appointed one of the delegates to the Council of the Scientific Alliance, and Mrs. N. L. Britton was appointed a member of the committee to arrange for the celebration of the tenth anniversary of the commencement of work in the development of the New York Botanical Garden, in place of Dr. D. T. MacDougal, resigned.

The scientific program was an illustrated lecture, by Dr. Henry Kraemer, of the Philadelphia College of Pharmacy, on "An Experiment in the Growing of Wild Plants, and a Plea for the Preservation of our Native Woodlands."

The experiments in the growing of wild plants were carried on in what would usually be considered a very unfavorable situation — namely, a narrow strip of ground about 60 feet long and varying from 17 to 31 inches wide on the northern side of a city house where the space between any two houses is not more than 8 feet in width, so that it receives very little direct sunlight. Below the thin coating of sod the substratum is composed mostly of débris from the building operations, such as pieces of tin, bricks, slate and pebbles. For two years an attempt was made to grow grass on this strip, but without success.

In 1903 a number of wild plants, including diminutive trees, small shrubs and perennial herbaceous plants, in all about a hundred species, were added. The plants have been distributed so as to give the best ornamental effect. At intervals of several feet through the middle of the strip the small trees and shrubs and larger herbaceous perennials, as blue cohosh and black snake-root, are planted. Between these are the smaller plants,

the more attractive and those producing the most flowers being near the front, as violets, wild geranium, etc. A few rocks are placed near some of the ferns, columbines, and other plants which seem to prefer a rocky situation. There is a procession of flowers from early spring when the blood-root, hepatics and spring beauties make their appearance, until fall when the asters and other plants are in bloom. Not only is there a succession of flowers, but the foliage is also of interest and beauty. The ferns and blood-root are especially interesting when the leaves are unfolding, and in the late fall the yellow leaves of the spice-bush and tulip-poplar, the red leaves of the maple and dogwood, and also the red berries of the Jack-in-the-pulpit and Solomon's-seal, and the blue berries of the blue cohosh, are very attractive at a time when the flowering season has gone by.

The desirability of preserving individual trees and strips of woodland in the suburbs of cities was considered, and the opinion expressed that if a universal sentiment were created in favor of this, the means would be forthcoming for the purchase and protection of trees and wooded lots. In this connection the statement was made "that there is no item of taxation which the people of London more cheerfully pay than those for the maintenance of small parks."

C. Stuart Gager,
Secretary.

NEWS ITEMS

Dr. Frederick DeForest Heald has recently been promoted to the professorship of agricultural botany in the University of Nebraska.

Miss Mary Franklin Barrett (B.L., Smith College, 1901; A.M., Columbia University, 1905) has been appointed an instructor in botany in Wellesley College.

Fred Jay Seaver (M.S., State University of Iowa, 1904), professor of biology in the Iowa Wesleyan University, Mt. Pleasant, Iowa, has been appointed university fellow in botany in Columbia University for the year 1906–'07.

Mr. Le Roy Abrams, fellow in botany in Columbia University,

1904–'05, and now assistant curator of the division of plants, U. S. National Museum, has been appointed assistant professor of systematic botany in Stanford University.

The sixth annual meeting and exhibition of the Horticultural Society of New York was held at the museum building of the New York Botanical Garden, May 9 and 10, 1906. The sixth summer exhibition will be held at the same place June 13 and 14.

Syracuse University is to have a botanical garden, of which Professor Joseph E. Kirkwood, the head of the department of botany of that institution, will have charge. A part of the "old Yates Castle" grounds will be used for the purpose.

The building of the California Academy of Sciences in San Francisco was destroyed by earthquake and fire on April 18. Botanical collections of great scientific value were lost, but a private letter from Miss Alice Eastwood, the botanical curator, brings the welcome information that most of the botanical type specimens were extracted and carried to a place of safety before the fire reached the building; "having them in a case by themselves was their salvation."

The third annual meeting of the Botanical Symposium will be held from July 2 to 9, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, N. Y. Through the courtesy of the members of the Adirondack League Club, the privilege of occupying the Club House for one week is extended to the members of the Conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. R. Single fare from New York City, $6.46. Board, $2.50 to $3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists are requested to notify Mr. Joseph Crawford, Secretary, 2824 Frankford Avenue, Philadelphia, Pa., if they expect to attend the Symposium.

Vol. 6 No. 6

TORREYA

June, 1906

A HISTORICAL SKETCH OF THE DEVELOPMENT OF BOTANY IN NEW YORK CITY.*

By Henry H. Rusby.

It is my purpose this afternoon to direct your attention to the influences whose workings have brought into existence the present highly satisfactory organization of botanical work in this city. Among many minor elements, three stand out prominently, and call for our special attention. They are: (1) local botanical gardens, including the present one, and the persons who have been associated in their management; (2) the botanical department of Columbia College; (3) the Torrey Botanical Club.

Were we to commence with the very earliest botanical history of our city, we should be carried back to a time when, as an important seaport in a new world, it was made the temporary headquarters of visiting botanists, who accumulated here their collections, maintaining some of them in a living condition, until the arrival of a convenient opportunity for dispatching them to the mother countries. Such occurrences as these, exerting little influence in the permanent development of a botanical center here, occupy no place in to-day's consideration. Developmental work of the kind that concerns us was active, previous to the close of the 18th century, at some points farther south, especially at Philadelphia, and in New England, but not at New York.

The first important event here was the work of Doctor, afterward Governor, Cadwallader Colden and his daughter Jane, who, near the middle of the 18th century, conducted their studies with the aid of a small botanical garden at their home, near Newburgh.

* An address delivered before the Torrey Botanical Club at a special meeting held on May 23, 1906, in commemoration of the tenth anniversary of the commencement of work in the development of the New York Botanical Garden.

[No. 5, Vol. 6, of Torreya, comprising pages 81–100, was issued May 23, 1906.]

Perhaps the most important part of this work consisted of the correspondence carried on with native and foreign botanists regarding their local flora, and the transmission of specimens. Miss Colden first made known our pretty little *Coptis*, or gold-thread.

A much more important event was the arrival here, in 1785, of the elder Michaux, who established a celebrated botanical garden at New Durham, N. J., the site of which is now occupied by the Hoboken cemetery. A brief account of this garden may be found in the *Bulletin* of our Club, **11** : 88. 1884. In that year I saw growing there a barberry bush which apparently represented the last trace of Michaux's plantings, except that the European medicinal shrub *Rhamnus Frangula*, which he appears to have introduced, has established itself in the adjacent lowlands, and at some neighboring points. Michaux's garden was established especially for the temporary cultivation of plants designed to be sent to France, or to yield seeds designed for such shipment. Nevertheless, so zealous an investigator as Michaux could not fail to utilize this agency for purposes of study, and his great work, *Flora Boreali-Americana*, published in 1803, and other works on North American botany, were thus materially enriched. Michaux's work in this country was continued by his son, one of whose important publications was a *Histoire des arbres forestiers de l'Amérique Septentrionale*, afterwards translated into English as *The North American Sylva*, and this also profited largely by the observations made by the father, while maintaining his garden.

During the time when the Michauxs were so active here, Mr. Samuel L. Mitchill was assiduously collecting plants in the vicinity of his home at Plandome, Long Island, a catalogue of which was published in 1807. His work is of special interest to us, since he was the first professor of botany in Columbia College.

The flora of Manhattan Island was at this time being very actively studied by Major John Le Conte, who in 1811 published an important catalogue relating thereto.

It is a well recognized historical fact that up to this time, and indeed for a long period following, botanical work proper in this country, consisted chiefly of the collecting and naming of plants, and the description of new species.

Writing of the period about 1814, made memorable by the publication of Pursh's *Flora Americae Septentrionalis* and Bigelow's *Florula Bostoniensis*, Darlington says "Botanical works now began to multiply, in the United States — and the students of 'the amiable science' found helps in their delightful pursuit, which rendered it vastly more easy and satisfactory than it had been to their predecessors."

The next botanical undertaking in this city was of the greatest importance in connection with our study, and calls for our particular attention. The successor of Dr. Mitchill as professor of botany and materia medica in Columbia College was Dr. David Hosack, a man of equal breadth and of great strength and energy. His interest in botany was chiefly medical. Most of the amateur botanists of that day were practising physicians, and many, if not most of the professionals had received a medical education and training, so that Dr. Hosack's attitude toward the science was not at the time peculiar. This fact reminds us that outside of the investigation of general and local floras, in their relations to geographical and taxonomic botany, interest then centered chiefly in the medicinal properties and uses of plants. A comparison between this branch of study as then understood and as now conducted can be briefly placed before you by stating that most of the plants then regarded as the important medicinal agents have been dismissed by modern medicine, except where it is trammelled by medical sectarianism. The explanation of their error is not that their results were reached empirically, for this is an excellent method, but that their empirical processes were full of natural sources of error, depending on impressions produced upon unqualified observers, among both patients and practitioners. The chemistry of plants was then practically unknown, whereas it is now the basis of medical botany. Since chemistry constitutes at the same time the visible basis of physiology, and physiology brings us as close as it is possible for us to get to the life of the plant, it follows that medical botany, while not entitled to the objective position that it held in the days of Hosack, is concerned with the same phenomena which engage the attention of the very highest workers in botanical science at the present day.

The great difference between the latter and the work as pursued by Hosack lies in our knowledge of the nature of the life processes and therefore of the proper and effective methods of studying them. Even in the state of ignorance which then existed, it was clear to such keen reasoners as Hosack that the reaching of sound botanical conclusions required that the living plant be kept under observation, and he became possessed of the strongest determination to establish a botanical garden adequate to the needs of local botanists and teachers of botany. After long efforts to secure sufficient coöperation, he at length decided to enter independently upon the enterprise, and in 1801 he purchased 20 acres of land at Elgin, now bounded by 46th and 50th Sts., and 5th and Madison Avenues (or probably of somewhat greater extent) and established the famous Elgin Botanical Garden, better known perhaps as the Hosack Botanical Garden. Besides his hardy plants, many were grown in a large conservatory. The site of this garden was described in 1811 as "about three and one-half miles from this city, on the middle road between Bloomingdale and Kingsbridge." This garden has of late years become so well known through various writings, that I shall not take up its general history. Hosack announced its primary object of attention as being the collection and cultivation of the native plants of this country, especially such as possessed medicinal value or were otherwise useful. He gratefully acknowledges assistance received in starting his Garden from Professor Mitchill, his predecessor, from the Hon. Robert R. Livingston and from John Stevens, Esq., of Hoboken. He soon learned what has recently become apparent to many persons here present, that the successful conduct of a botanical garden is a work of enormous labor and serious responsibility, and that one man, otherwise engaged, cannot accomplish it. With the garden already in actual successful operation, it was not so difficult to enlist state interest, and the legislature was induced to purchase it in 1810, and to provide the necessary funds by means of a lottery. Hosack subsequently enjoyed the classical distinction of all successful promotors of great enterprises, in being assailed by the high-class scum of citizenship. By subsequent legislative action the

property was turned over to Columbia College, and its use diverted from that of a botanical garden to that of highly profitable rentals.

We cannot understand the botany of Hosack's time without a brief glance at some of his contemporaries and immediate successors, especially those who exerted local influence. The list includes the names of some of the most honored of American botanists. Biographical sketches of all are to be found in our *Bulletin* file, so that I need not repeat the purely historical data, but may speak of the character of these men and of their work, in its relation to our subject. Foremost of them all was John Torrey, whose name is commemorated, I hope permanently, in that of our society. Following Dr. Hosack, he was the third of the five men who, up to the present, have occupied the chair of botany in Columbia College. His characteristics may be expressed in the terms, strong personal character, broad scholarship and great intellectual ability. Although best known to us as a botanist, yet thirty years of his life were those of a great teacher and worker in chemistry at the U. S. Military Academy at West Point, in the College of Physicians and Surgeons of this city, in Princeton College, and as U. S. Assayer in the New York office. Had the necessary facilities then existed in this country, it seems likely that this man, combining such a great knowledge of botany and chemistry, might here have developed important researches in the chemistry of plants. As a matter of fact, his knowledge of botany was acquired chiefly as a recreation in the hours of leisure afforded by his other professional work. Yet Underwood truly writes, "When the annals of American botany are finally written, no name will have a more conspicuous position than that of John Torrey."

Almost before reaching manhood Torrey was one of the founders of the New York Lyceum of Natural History, and was the leader in publishing, through it, a catalogue of plants growing within thirty miles of the city. Five years later he published the first part of his *Flora of the Northern and Middle Sections of the United States*, and later his *Compendium* on the same subject, important forerunners, in more than one way, of Gray's Manual.

These accomplishments proved him the great master that he was, and soon his hands were crowded with important work, especially connected with the active explorations of our western territory then in progress. In this work he was a close associate of Asa Gray, and probably their most important work was tne first parts of their *Flora of North America*, published from 1838 to 1843. Many men whose work has thus branched out from local into general lines have allowed the latter to supplant and replace the former, but this was not true of Torrey, who combined in rare degree generic and specific powers. Not only were his interest and activity in local work undiminished, but they grew apace, and his patient and quiet enthusiasm gathered about him a group of associates who not only were devoted to him personally, but imitated and emulated his work. In this saying is stated the immediate origin of the Torrey Botanical Club. At various points in the history of our Club, we have been reminded that "a nation has arisen that knew not Joseph," and various proposals have been made for changing the name of the society. Let us record now the opinion that the selection of Torrey's name for this purpose was so just, natural and appropriate that its retention amounts to a historical necessity.

Except for the published works of Torrey, most of those of this early period which here concern us were of a somewhat general nature, but naturally including our local interests. Of these may be mentioned the following: In 1813, Muhlenberg's *Catalogue of North American Plants*, and in 1817 his work on North American grasses and sedges; in 1818, Nuttall's most scholarly work on the genera of North American plants; in 1820, Gray's *Genera;* in 1822, Schweinitz's *Monograph of the Genus Viola;* in 1833, Beck's *Botany of the Northern and Middle States;* in 1834, Schweinitz's work on North American Fungi, and in the same year, Gray's *Monograph of the North American Species of Rhynchospora.* In the meantime, very important works of a similar character were being produced in the South, and to a lesser extent, in the West.

These publications, it will be observed, were chiefly of interest to those actively engaged in original work, and not to young

students. In 1803 there appeared about the first work designed especially for the latter class, an elementary work on botany by Barton. Writing of 1824, Darlington says: "About this time some of the schools in the Northern States began to make a profession of teaching botany, and a demand for suitable books for this purpose arose. Accordingly, a number, such as they were, soon appeared. Among the most successful was a *Manual*, compiled by Professor Amos Eaton, of Troy, New York." Of the character of the educational works of the period, little need be said, since it is sufficiently indicated in that of the work in which botanists were then engaged. This sort of botanical teaching entered upon its most active stage with the appearance of Gray's *Elements of Botany*, in 1836, a work that is still being sold upon an extensive scale, and this, in your speaker's opinion, very greatly to the advantage of botany, in spite of the many books of different character, the use of which we so greatly enjoy. The publication, for the use of students, of text-books on structural botany, and later on morphology, in connection with manuals on local floras, became very popular, and of incalculable value in interesting people in the study of plants.

We must now pass from this general consideration of local botanical development up to the middle of the last century, and follow some special influences proceeding from the growth of the botanical department of Columbia College. During the period when Dr. Torrey was at its head, that department was very actively engaged in educational work, though this was of the peculiarly restricted sort characteristic of the times. About the time of his death in 1873, his herbarium and library, which he had previously maintained in his home, came into the possession of Columbia, together with the herbaria of Crooke, Chapman and Meissner. To these, collections from various parts of the world, and especially from those parts of the United States then being explored, were rapidly added, and a very large and important herbarium soon grew up; but no professor of botany was appointed to succeed Dr. Torrey, and the herbarium was neglected by the curator in charge. A very large part of it was not classified, nor even named, and lay in the form of a small mountain of dusty bundles

which were not, and could not be consulted. Botanical instruction was most meager, and was merely a part of the general course in biology. There was not, in fact, a department of botany, the subject being treated as a subordinate of geology, under Professor John S. Newberry. From 1875 to 1879, Dr. Britton was a student at the School of Mines, and was strongly attracted, by natural taste and ability, toward the botanical side of his work. When upon his graduation he was appointed assistant to Dr. Newberry, he appreciated clearly the great value of the materials for a botanical department, to be organized on a new and modern basis, which were in the possession of the College, and he began a careful and systematic examination of them. In speaking of this exceedingly important event in the general, as well as in the botanical, history of New York, your speaker takes the keenest delight, as he was for most of the time one of the closest associates of Dr. Britton, and can speak of that which he not only saw, but which he watched with appreciative interest.

A special stimulus to Dr. Britton at this time was his interest in his first great botanical undertaking, the preparation of an elaborate catalogue of the plants of New Jersey, this also, being performed subordinately to a department of geology. In this undertaking, an intimate association with the members of our Club and an active participation in its work were prime essentials to success, an illustration of the way in which existing forces worked together in carrying forward our natural botanical development. Another potent influence of a similar nature should be here recorded. At this time considerable botanical material from distant parts of this country and from other hitherto unexplored regions was coming to this city for original study, and this made it imperative that Columbia's botanical house should be set in order in the interest of comparative work. With the knowledge and encouragement of Dr. Newberry, but with comparatively little on the part of others concerned in the management of the college, Dr. Britton carried on this work in the interim of his official duties, until at length a great working herbarium existed where before there was chaos. At the same time the botanical instruction was being extended

and, of greater importance, was being modernized. When the Doctor was at length prepared to make the situation known to Columbia, it was not to submit plans for the organization of a botanical department, but to present to it one already made, and requiring only to be officially recognized and formally named. The performance of these ceremonies, with suitable provision for maintenance, guaranteed the position of New York as one of the first botanical centers of the country, and later of the world, with Dr. Britton as Columbia's fourth professor in this department. Thus we see that at every important stage in its development, the botanical department of Columbia has owed its prosperity not to the institution as such, but to some earnest worker, ready to make the sacrifice of love. Hosack individually made the botanical garden that afterward enriched the institution; Torrey accumulated the herbarium that became the corner-stone of the later structure; Britton silently — one may almost say surreptitiously — brought about changes which have finally placed it in the vanguard of the world's botanical forces.

The intercourse and personal and professional associations dependent upon the increasing number of persons in and about New York who became interested in botanical work in Torrey's time led most naturally and inevitably to a botanical society, at first incidental and unorganized, later a formal organization.

As is true of so many institutions which grow healthily and attain to great and permanent success, the exact date of the origin of our Club can hardly be fixed. Those of you who take even the slightest general interest in this subject should not fail to read * the inaugural address of Dr. George Thurber, delivered at the Astor House in 1873, on the occasion of his first election as our first president. He confesses his entire inability to fix on the time when Torrey and his friends virtually established the society. He says that for a long time after the election of the first set of officers the members found it impossible to break from the habit of informal, free-and-easy, conversational meetings which had grown up and which, I must remark, have always been found the most effective in the Club's work, whenever they have recurred.

* Bull. Torrey Club, **4**: 26–39. 1873.

The Club's formal organization was undertaken in 1867, and its incorporation occurred four years later, under the name New York Botanical Club, changed the following year to that which it now bears. Within three years after its establishment the Club began issuing a monthly publication, the *Bulletin*, since uninterruptedly maintained. Its prefatory note declared its primary object to be "to form a medium of communication for all those interested in the Flora of this vicinity, and thus to bring together and fan into a flame the sparks of botanical enthusiasm, at present too much isolated. . . . We have chiefly in view the development of a greater botanical interest in our neighborhood, and found our hopes of success as much upon learners as upon the learned." May I pause here to ask all those present to regard this sentiment as that which actuates our Club to-day. There have been unfortunate periods in our history when this fundamental principle has been lost sight of; when learned newcomers, unfamiliar with our history and character, have assumed that we existed for the learned only. Believe me that this spirit does not exist to-day. We are most desirous that the knowledge should go abroad that the Torrey Botanical Club exists and is maintained for the most humble learners, equally with the learned, and our invitation to membership is to-day most cordially extended to everyone who desires either to assist in strengthening our influence, or to be assisted by us.

In the further unfolding of its objects, the *Bulletin* unconsciously states the object of the Club's organization: "An attentive study of plants in their native haunts is essential to the advance of the science, and in this respect the local observer has an advantage over the explorer of extensive regions, or the possessor of a general herbarium. He can note the plant from its cradle to its grave; can watch its struggles for existence, its habits, its migrations, its variations; can study its atmospheric and entomological economies; can speculate on its relations to the past, or experiment on its utility to man." Ecology is thus clearly seen to be the object of study, notwithstanding that the name of it was not generally discovered by our botanical fraternity until about 1890, nor the active and merciless chase of the poor

thing by American botanists well under way until about five years later.

From this time up to the establishment of the New York Botanical Garden the history of our Club is practically that of botany in this city, for very little was done that was not directly or indirectly connected with us or, one might say, actually centered about us. This fact is of the utmost importance in our study, since upon it depends the essential character of most of what has since occurred.

The Club's history is so voluminous that it requires separate and extended treatment, and I can here do little but refer to its influence. Its first officers were George Thurber, president; Timothy F. Allen, vice-president; A. A. Crooke, treasurer; James Hogg, corresponding secretary; P. V. LeRoy, recording secretary; William H. Leggett, editor; P. V. LeRoy, curator.

Some of the more influential of the early members call for attention at this point.

(To be continued in the July number.)

SOME MORE COASTAL PLAIN PLANTS IN THE PALAEOZOIC REGION OF ALABAMA

By Roland M. Harper

The unusual occurrence in the Cumberland plateau region of Alabama of quite a number of species of plants rarely met with outside of the coastal plain has been mentioned in the last few years by Kearney,* Mohr † and Harbison, ‡ but the subject is by no means yet exhausted, as recent investigations have shown.

In November last it was my privilege to spend two days in DeKalb County, one of the northeasternmost counties of Alabama, and even at that late season I was fortunate enough to find most of the coastal plain plants already reported from that region, as well as some interesting additions to the list. On the 24th I spent a few hours on Sand Mountain, near its southeastern edge,

* Science II. **12**: 830–842. 1900.

† Contr. U. S. Nat. Herb. **6**: 77–79. 1901.

‡ Biltmore Bot. Stud. **1**: 154. 1902.

in the vicinity of Chavies P. O. (Sand Mountain, it should be explained, is a splendid example of a synclinal plateau capped by Carboniferous sandstones. In DeKalb and Jackson counties it is about 200 times as wide as high, being at least twenty miles wide and only a few hundred feet above the narrow valleys which bound it ; so that when on its summit away from the edges it is difficult to realize that one is on a mountain at all.) Near Chavies a clear stream known as Town Creek runs lengthwise of the mountain, from northeast to southwest, and on exploring the banks of this creek a short distance I made some rather startling discoveries.

On rocky banks, probably within the reach of floods, *Chondrophora virgata* (Nutt.) Britton was quite common. This is a new station for it, though it had already been reported from this general region. * Associated with it was *Coreopsis verticillata* L., which Dr. Mohr found on Lookout Mountain in the same county. In crevices of rocks a little lower down, in the edge of the water, were some tufts of rush-like evergreen leaves, which at first sight I would have unhesitatingly pronounced an *Isoëtes*, especially since I knew I was in the only Alabama county from which an *Isoëtes* has been reported. But on pulling up a tuft I discovered that the leaves were jointed in the manner of many *Junci*, and contained no sporangia at their bases. The odor of the plant then proclaimed it to be an umbellifer, and the characteristic double curvature of the leaves (outward and then upward) enabled me to recognize it as a species which of all others I would have least expected there. For this species is not one of those included in Mohr's Plant Life of Alabama, and moreover, it is not even congeneric with anything which was known to exist at the time that work was published. It is the sole known representative of a genus which had been described by Dr. Rose less than two months previously,† from two collections made in the coastal plain of Georgia, in 1902 and 1904. A few minutes later I secured enough remains of stems and inflorescence to establish its identity beyond a doubt, and a new genus was thus added

* For notes on its distribution, see Bull. Torrey Club **32** : 168. 1905.

† *Harperia nodosa* Rose, Proc. U. S. Nat. Mus. **29** : 441. *pl. 3.* O 1905.

to the known flora of the mountains and to that of Alabama at the same time.

This plant seems to be a biennial, and the leaf-character above mentioned does not appear in the flowering and fruiting specimens on which the original description was based, but I had noticed it at the New York Botanical Garden in 1903, in some plants raised from seeds of the type-specimens collected the year before. (The same plants flowered in 1904 and have probably since died.)

With the umbellifer was *Dianthera Americana* L., a characteristic plant of such situations, and in shallow rocky pools close by *Orontium aquaticum* L., both of which seem not to have been reported from this part of the state before. (The altitude of this point, it should be observed, is about 1150 feet above sea-level, according to the topographic maps of the U. S. Geological Survey.)

At the same place was also a *Xyris*, as yet unidentified, though it is in all probability the same as one reported from Lookout Mountain by Dr. Mohr under the name of *X. flexuosa* Muhl. In small areas of moist sand just above the rocky bed of the creek I noticed *Juncus repens* Michx. and *Gratiola pilosa* Michx., two more additions to the known flora of the mountains, though I had once before found the latter in the metamorphic region of Georgia.*

On flat rock outcrops a short distance away from the creek were noticed *Crotonopsis linearis* Michx. and *Arenaria brevifolia* Nutt., both of which are very characteristic of flat granite outcrops in Middle Georgia and are also known on Altamaha Grit outcrops in the pine-barrens of Georgia.†

On the way back from Town Creek still another surprise awaited me in the shape of several specimens of *Polygala nana* (Michx.) DC. in full bloom (it probably flowers throughout the year or nearly so) in dry woods between Chavies and the brow of the plateau. This, too, was previously known only from the coastal plain.

* See Bull. Torrey Club 30 : 294. 1903.

† See Torreya 4 : 140. 1904.

The next day I ascended Lookout Mountain from Fort Payne at its base, and went six or eight miles across the comparatively level summit to Little River, which runs lengthwise of the mountain much as Town Creek does on Sand Mountain, and at the point where I crossed it, as well as for some miles in either direction, forms the boundary between DeKalb and Cherokee Counties. Little River is frequently mentioned in Dr. Mohr's writings as a result of his work at a point about a dozen miles farther up, near Mentone. On this trip I found again all the plants mentioned above—with the exception of *Juncus repens* and *Gratiola pilosa* — and many others of equal interest.

Little River was so low at this time that at one point, just above a considerable fall, I was able to cross it on the rocks. Here *Chondrophora* was abundant on the rocks out in the stream, almost associating with *Dianthera*, in places which are doubtless submerged at high water. *Orontium*, *Harperia* and *Coreopsis verticillata* occurred on both sides of the river (and therefore in both counties) in precisely the same manner as I had seen them on Sand Mountain the day before. In small bogs like those along Town Creek I found for the first time that *Sarracenia* which has been reported from these mountains by all three writers above mentioned. Dr. Mohr referred it to *S. Catesbaei* Ell., but recent researches by Prof. J. M. Macfarlane have shown that Elliott's plant was very different from this. Further study in the growing season will be necessary to determine how much the mountain plant differs from *S. flava*, if it differs at all.

With the *Sarracenia* were among other things *Lachnocaulon anceps* (Michx.) Morong, *Smilax laurifolia* L., a small *Drosera*, presumably *D. brevifolia* Pursh, *Polygala nana*, *Sabbatia campanulata* (L.) Torr. and *Utricularia subulata* L. The *Lachnocaulon* does not seem to have been reported outside of the coastal plain before, though I have seen specimens collected on the same mountain several years ago by Prof. A. Ruth. The *Smilax*, a common coastal plain species, has been reported from the mountains of Tennessee by Dr. Gattinger, but not from northern Alabama before; while the *Drosera*, *Polygala* and *Utricularia* were previously known only from the coastal plain.

A number of rare plants characteristic of the mountain flora were seen on the cliffs along the river, but it is not the purpose of this paper to enumerate them. On the way back to Fort Payne I found *Polygala nana* again at a place where it was quite abundant in dry woods, as on Sand Mountain the day before.

On several flat sandstone outcrops away from the streams the flora strongly resembled that of granite outcrops in Middle Georgia and therefore to a lesser extent that of Altamaha Grit outcrops in South Georgia. The commonest inhabitants of such places, in approximate order of abundance, seemed to be as follows : *Crotonopsis linearis* Michx., *Sarothra gentianoides* L., *Diodia teres* Walt., *Stenophyllus capillaris* (L.) Britton, *Diamorpha pusilla* Nutt., *Arenaria brevifolia* Nutt., *Cyperus inflexus* Muhl. (new to Alabama), *Trichostema lineare* Nutt., and *Polygonum tenue* Michx. *Chondrophora virgata*, which associates with about half of these species in the Altamaha Grit region, seemed to be entirely absent here, being in the mountains apparently confined to the immediate vicinity of streams.

In the dry and damp woods which cover most of the plateaus above mentioned probably as many as nine tenths of the species which I was able to recognize are common to the coastal plain, though most of them are quite widely distributed through the intervening territory. The analogies between these plateaus and some parts of the coastal plain, especially the Altamaha Grit region, are numerous and striking, but I will not attempt to discuss them at this time.

Soon after leaving Lookout Mountain I spent about 24 hours in Limestone County, the middle one of the three Alabama counties which lie wholly north of the Tennessee River. The strata here are Lower Carboniferous, but there are very few outcrops of rock, and the whole aspect of the country, or as much of it as I saw, is strikingly like that of some parts of the Eocene region of the coastal plain.

Oaks of various kinds abound in Limestone County, but immediately north of Athens, the county-seat, *Pinus Taeda* seems to be the prevailing tree, though this is very near the limit of its known range in that direction, and pines of every kind seem to

be comparatively scarce north of the Tennessee River. Among these pines are a number of shallow ponds strongly resembling some of those near the inland edge of the pine-barrens in Georgia. In them besides the *Pinus Taeda* were *Panicum agrostoides* Muhl., *Cyperus pseudovegetus* Steud., *Rhynchospora corniculata* (Lam.) Gray, *R. glomerata paniculata* (Gray) Chapm., *Carex glaucescens* Ell. (abundant), *Xyris* sp., *Liquidambar Styraciflua* L., *Rhexia* sp., *Ludwigia glandulosa* Walt., *Cephalanthus occidentalis* L. and *Pluchea petiolata* Cass.; and around the edges of one, *Erianthus strictus* Baldw. and *Juncus repens* Michx. Of these *Carex glaucescens* was previously supposed to be confined to the coastal plain, and the two Rhynchosporas mainly so. *Erianthus strictus* had been reported from near Tullahoma and Jackson, Tennessee, by Dr. Gattinger, but was otherwise known only from the coastal plain, from Georgia and Florida to Texas. In Georgia I have seen it only in places where the Lafayette formation seems to be absent, a condition which is of course fulfilled at the locality here described. The case of *Juncus repens* has already been mentioned above.

In alluvial bottoms in the southern part of Limestone County, especially in the Tennessee River swamps opposite Decatur, I saw considerable quantities of *Nyssa uniflora* Wang., and I was informed that it is an important timber tree there. This species is not generally known to occur outside of the coastal plain,* though I have seen it at a few places in the metamorphic and Palaeozoic regions of Georgia.

This discovery of several more coastal plain (or "pine-barren," or "austroriparian") plants in the mountain region of Alabama lends additional interest to the problem of explaining their occurrence there. The solution of this problem—which is by no means hopeless, though I am not prepared to undertake it at present — must go hand in hand with the study of the geological history of the regions involved, the details of which are still very imperfectly known. Although the flora of Alabama has prob-

* Its occurrence north of the Tennessee River in Alabama is mentioned incidentally and in a very inconspicuous way on page 43 of Bulletin 58 of the U. S. Bureau of Forestry, published in the summer of 1905.

ably been more carefully studied than that of any other southern state, thanks to the extended explorations of Dr. Mohr and others, too little is known even yet of the actual details of plant distribution and habitat relations in this or any neighboring state to warrant us in theorizing much on the subject at present. Later investigations in other parts of Alabama have led me to suspect that some of these outlying stations for coastal plain plants are not as isolated as has been supposed, but it will take some time to confirm this suspicion.

It is rather singular that many of the coastal plain plants above mentioned, even the rock-loving ones, seem to be confined in the mountains to the immediate vicinity of the larger streams. When this is satisfactorily explained we will perhaps have the key to the whole situation. But a great deal more careful field work has got to be done before this and analogous problems in other parts of the world can be solved.

Geological Survey of Alabama.

TWO NEW AND SOMEWHAT ANOMALOUS BLACKBERRIES

By W. H. Blanchard

The first plant now to be described must be placed with the dewberries though it is slow in getting down to the ground, and in vigorous plants the thick base of the canes is often two feet high the second year. The leaves on strong, new canes resemble those of *Rubus nigrobaccus* Bailey ; the abundance of unequal glandular hairs suggests the *setosus* class, while the inflorescence and energetic tipping are manifestly typical of the dewberry. Therefore I propose to name this interesting plant

Rubus permixtus sp. nov.

Plant recurving and mostly prostrate with abundant glandular hairs of varying lengths (not the large glands with short stalks of *R. nigrobaccus*).

New canes. — Stems erect at first and from one to two feet high, recurving and running on the ground from three to six

feet, at length branching and tipping freely, stout and pentagonal at the base. Prickles of fair size but rather weak and not numerous, on the angles or in rows over the angles of the pentagonal pith, these grading into small prickles set at random and into glandular bristles passing into glandular hairs. Leaves of moderate size, dark yellow-green and slightly hairy on the upper surface, lighter and pubescent below, 5-foliolate on vigorous canes. Leaflets oval, short-pointed, the middle one quite broad, over one-half as wide as long and rounded at the base; the others narrower and broadly wedge-shaped, finely and doubly serrate-dentate, outline otherwise entire. Petioles and petiolules grooved, stout with weak, hooked prickles and abundant glandular hairs both bristly and slender; the petiolule of the middle leaflet three-fourths of an inch long, the lateral ones short and the basal leaflets sessile.

Old canes. — More prostrate, the prickles and glandular hairs but little impaired, and in protected places the leaves of the previous season sometimes persisting. New growth upright, polymorphous, one and two leafy branches or stemlets from each old leaf-axil, the axis zigzag, three to twelve inches high, nearly terete, with a few weak prickles, abundant unequal glandular hairs and non-glandular pubescence. Pure leafy stemlets few, resembling new canes, leaves on them 3- and 5-foliolate; the other growth 3-foliolate or on some vigorous stemlets 5-foliolate below; leaflets rather broad, short-pointed, all leaves on old canes closely resembling those of new canes in color, serration and pubescence. Stemlets tipped with a racemose, irregular inflorescence, five- to fifteen-flowered; flowers on slender pedicels set at a small angle with the axis, mostly subtended by small bracts, occasionally by an unifoliolate leaf. Flowers one inch broad; petals oval, regular in shape, two-thirds as wide as long. Fruit black, sweet, very edible, rather small, short-cylindric, one-fourth to three-eighths inches long, drupelets rather large. Flowers in early places June 1; fruits the middle of July, continuing in fruit in moist rich situations till September 10 or even later.

In open places in dry or rich ground. Frequent in an area with a radius of two miles partly in the northeastern part of Putney, Vt., and partly in the southeastern part of Westminster, Vt.

My first acquaintance with this peculiar species was in June, 1902. It grows in the immediate neighborhood of my home and I am continually finding new stations by the roadside, by fences

in mowings and in other neglected places. In dry, sunny, well-fed pastures and in other similar situations, the epidermis and its appendages are a deep red, while in tall grass or light shade they are often very green. It spreads widely by tipping, and the new plants thus originated as well as the new stems of old plants are at first very highly colored, very thick, fleshy, and bristly.

Whether this plant originated as a hybrid or as a mutant, whether it is a direct creation or is to be explained by one or more of the hypotheses sure to be invented in great profusion in the future, I shall not discuss ; but it is here and seems to be as good a species and as well worthy of a name as any rose, knotweed, aster, golden-rod or oak with which I am acquainted.

The second plant to which attention is invited is a leafy high blackberry. This is erect, strong and stocky, glandular and pubescent, and the old canes are very leafy, especially when somewhat killed back on rank-growing canes. The appearance of the plant in dry and in rich moist situations but a few rods apart is considerably different. It may be named with good reason

Rubus frondisentis sp. nov. Leafy Bramble

Plants with a great abundance of large, stalked glands.

New canes. — Stems erect, never reaching the ground, three to five feet high, stocky, soft, often branched, more or less pentagonal and often slightly furrowed, with remarkably numerous stalked glands. Prickles weak but not bristly, varying much in size, the larger mostly on the angles, the smaller set at random, less than three-sixteenths of an inch long, straight with a slight backward slant. Leaves of fair size, seven inches long and wide, not thin, 5-foliolate, yellow-green above with white appressed hairs, lighter below and quite pubescent and velvety to the touch. Leaflets broadly ovate, pointed, finely and doubly serrate-dentate, outline otherwise entire, rounded at the base, the middle leaflet over one-half as wide as long, sometimes cordate, the others narrower. Petiole and petiolules grooved above, very glandular, prickles fine, weak and recurved, the petiolule of the middle leaflet one inch long, those of the side ones one-half inch long, the basal ones short.

Old canes.— Erect, prickles and glandular covering somewhat impaired. Second year's growth consisting normally of thick,

short racemes above, and long leafy branches tipped with inflorescence below, one from each old leaf-axil; more often, the stem killing back, two or more leafy fruit-branches from the axils of each old leaf. Terminal racemes two to four inches long, very pupubescent and glandular, about 10-fruited on short pedicels subtended by small bracts and with a few small leaves at the base. No pure leaf-branches yet observed. The branches below four to eight inches long with 3-foliolate leaves. Leaflets broad, yellow-green, rounded at the base, short-pointed, rather coarsely serrate-dentate, hairy above and pubescent below. Axis seldom terete, prickles few and weak, very pubescent and glandular. Infloresence short, often many of the six to ten pedicels subtended by large bracts or small unifoliate leaves. Flowers from one to one and one-fourth inch broad, petals long-oval, one-half as wide as long. Fruit small, cylindric, one-fourth to three-eighths inch long, black and edible, drupelets rather large, often but few ripening. Flowers the middle of June, fruit ripe early in August. Very little good fruit.

Type station, Townshend, Windham County, Vermont, in the immediate neighborhood of the brick school house situated near the residence of Deacon J. O. Follett and in his lot adjoining.

I first noticed this plant July 5, 1902, and have repeatedly visited the type station. Plants quite similar to these grow in three other places in Townshend and I have one station on Bemis Hill in Athens, Vt., a few miles distant. Another station is on Signal Hill, Alstead, N. H. The plants at all these stations differ a little from each other, but even at the type station a difference in soil and surroundings causes a considerable variation. This is to be expected nearly everywhere in the rose family.

WESTMINSTER, VERMONT.

THE EARTHQUAKE AND THE CALIFORNIA ACADEMY OF SCIENCES

The following graphic and interesting account of a most lamentable event was written with no expectation of seeing it in print, but its author, Miss Eastwood, has kindly consented to its publication, with modest apologies for its personal tone. The author has not had the opportunity of reading proof. [ED.]

2421 Ridge Road, Berkeley, Cal.
April 28, 1906.

My dear Dr. Britton:

I was deeply touched by your ready expression of sympathy and offer of help. While we are not cast down, we need it all. No words can give you an idea of the ruin and desolation of our city. I was over yesterday for the first time since I left April 19 late in the afternoon.

I managed to save most of the types but had very little time, not more than half an hour. Having them in a case by themselves was their salvation. They, together with the records of the Academy, are at Fort Mason, where I took them for safety. I don't know why it was left to me to take care of these precious relics except that I took the responsibility.

The earthquake occurred about 5.15 A. M. and I was down before 6.30. The outer door was padlocked and I could not get in but the people in the store next door were there and I knew that there was a door of communication so I had them let me in. It was necessary to climb over a lot of fallen bricks to reach the staircase of the front building but it was not impossible. I went to the sixth floor where the bridge connected the two parts of the building but it was gone and I could not fly across, so as there seemed to be nobody anywhere around I had to go back. Then I walked up and down the street hoping to see some one to help me. A young man, Robert Porter, one of my friends, hailed me and I told him my story. We went back and again went through the store. By this time, Mr. Loomis, the director of the museum, Miss Hyde, the acting librarian, Mrs. Newell, my assistant, had come and they had opened the door of the museum, so we could get in over the wreck of the marble staircase at the main entrance. We had to climb up the staircase to the sixth floor mainly by the iron banisters which seemed to be firm. I got out the bundles and Porter tied them up. The Harkness types were in boxes labelled alphabetically and I could be sure that I had every box. The case containing them had been thrown down on its face, and the boxes were somewhat scattered. I could not save a book. We lowered the things down by string doubled to the floor of the museum six stories below and I was there to receive them. I remembered the saxifrage types had not been put away as I had left them out so as to send pieces to you and I went back after them. When we reached the street the building next door was on fire and the soldiers had come to keep people from crossing the street or get-

ting into the buildings. I rushed over to a safe deposit bank opposite where I had a box to beg them to take our stuff but there was a line of men half a block long who were there for their money and it was hopeless. When I went back I had to have permission of the officer in charge.

Porter went to see if he could find an express wagon or automobile. We had to carry all the things across Market street as no vehicles were permitted on the street. I seemed to be the only one with any ready cash. I asked how much would the cost be to take the stuff to where I lived. When the man said it would be a big price my heart sank as I had only fourteen dollars. But he charged only three and I was so grateful that I gave him four.

I had the janitor with me on the wagon and he helped me get the things into the front hall where they were all day. Towards evening I became uneasy and decided to take them to a friend's house on Russian Hill, which seemed a safe place. Some of my young men friends helped me and we carried them, making several trips. It was impossible at this time to get any kind of a conveyance without paying a big sum down. I went back to my home but could not sleep though the fire was still distant. I picked up a few things and packed them so as to carry some personal belongings. We could only take what we could carry in our hands. Mr. Worcester, my chief friend on Russian Hill, took the things into his house. He also told me that I could have them taken to Fort Mason with some very valuable paintings and books next day if there seemed to be any danger. Well, they went next day and that night there was fire raging all around that hill and dynamite almost shot those who stayed into the air, but there were a few houses saved on that hill and Mr. Worcester's is one of them.

The greatest loss to the city is the loss of all libraries and the scientific collections. Buildings can be replaced but these never can be.

I do not intend to give up but am making plans already what to do. I may come East in the fall and see how you do things and get ideas. I never had time before and now I have not much money but I am not destitute and am much better off than a great many.

There was never any panic and you see no signs of repining. The hard time is to come.

I was taken in by lovely people whom I had never met and am with them yet. It is best not to think of what is lost but of what is saved and best of all to think of the kindness of those

dear friends who give us help and sympathy. Every one is deeply grateful for the help that is coming to us from everywhere.

I had a lot of fine duplicates ready to send you but they are all gone.

Gratefully yours,
ALICE EASTWOOD.

SHORTER NOTES

Ranunculus sicaeformis Mackenzie & Bush, sp. nov. Perennial, with thickish, but not tuberous roots, the stems at first erect, but in age ascending or reclining; runners not seen; whole plant very strongly whitish or yellowish hispid-pubescent: lower leaves with petioles 20–25 cm. long, the blades 3-divided, the divisions long-stalked, 3-cleft and irregularly and sharply incised-serrate, the segments broad; stem leaves similar, but smaller: flowers on peduncles 3–10 cm. long; sepals 5, strongly hispid, ovate-lanceolate, 6 mm. long: petals 5, yellow, obovate, 10–12 mm. long: stamens numerous: head of fruit globose, the receptacle strongly pubescent: achenes obovate-cuneate, the margin sharp and thick, terminating in a very stout, straight or slightly curved dagger-shaped beak as long as the body, the whole 6 mm. long.

Readily distinguished from *R. septentrionalis* Poir., its nearest relative, by the very hispid stems, more strongly pubescent receptacle, and the very stout beak of the achene.

The type, collected by myself (*no. 95*) at Buckner, Jackson County, Missouri, on May 30, 1898, growing in low, wet prairies, is in my private herbarium. Co-types are in the herbarium of the New York Botanical Garden, and in the herbarium of the Missouri Botanical Garden. The only other specimen seen is one collected June 7, 1886, in Hennepin County, Minnesota, by "O. W. O.," distributed from the herbarium of the University of Minnesota, and now in the Columbia College herbarium.

K. K. MACKENZIE.

A NOTE UPON IPOMOEA CUNEIFOLIA A. GRAY.— The rarest and least known species of *Ipomoea* in the United States is undoubtedly *I. cuneifolia*, but unfortunately this very appropriate name given to it by Asa Gray is a homonym.

Ipomoea egregia nom. nov.

I. cuneifolia A. Gray, Proc. Amer. Acad. **19**: 90. 1883. Not Meissn. 1867.

Little need be added to the original description, except to note that it is one of a group of slender plants with small perennial tuberous roots and annual stems, slender funnelform corollas and globose, 4-valved capsules, to which belong such species as *Ipomoea Lemmoni* A. Gray, *I. leptosiphon* S. Wats., *I. muricata* Cav. (*I. capillacea* G. Don), *I. madrensis* S. Wats., and *I. leonensis* Robinson. The type of *I. cuneifolia* A. Gray, and therefore of *I. egregia*, was collected at Tanner's Canon, near Fort Huachuca in the Huachuca Mountains of southeastern Arizona by J. G. Lemmon, Sept., 1882 (*no. 2837*). Type in the Gray Herbarium, duplicate in the National Herbarium. HOMER D. HOUSE.

CLEMSON COLLEGE, S. C.

PROCEEDINGS OF THE CLUB

APRIL 25, 1906.

The Club met at 3:30 P. M. in the Museum Building of the New York Botanical Garden. President Rusby was in the chair and there was an attendance of sixteen.

Professor Richards, chairman of the committee to arrange for the celebration of the tenth anniversary of the commencement of work in the development of the New York Botanical Garden, presented a report.

Notice of the coming Botanical Symposium to be held from July 2 to 9, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, N. Y., was read.

The following communication from the secretary of the Council of the Scientific Alliance to the secretary of the Club was read:

NEW YORK BOTANICAL GARDEN,
BRONX PARK, April 14, 1906.

Dear Sir:

I take pleasure in stating that the proposition of effecting a closer relationship of the societies composing the Scientific Alli-

ance of New York with the New York Academy of Sciences, considered at a meeting of the Council of the Alliance held April 11, 1906, based on the plan outlined in my letter to you of February 8, 1906, was unanimously adopted by the Council, delegates from all the societies being present, as follows:

In order to enforce the further unification of scientific organization and the development of science in the City of New York, the following arrangements are proposed, made possible by the present concentration of interest in natural science at the American Museum of Natural History, and the increased resources of the New York Academy of Sciences.

1. Societies organized for the study of any branch of science may become affiliated with the New York Academy of Sciences, without surrendering their own name, or losing their identity or autonomy, by consent of the Council of the Academy.

2. Members of the affiliated societies may become members of the Academy by paying the Academy's annual fee, but as members of the affiliated societies they shall be associate members of the Academy, with the rights and privileges of such associate members, except the receipt of its publications, without paying an additional fee.

3. In order to obtain the right to vote or to hold office in any of the associate societies thus affiliated, or to receive their publications, members of the Academy must pay annual dues to such society as well as those of the Academy, but all other privileges of membership would be included in the Academy's annual dues.

4. The New York Academy of Sciences, to encourage the work of societies thus affiliated with it by furnishing means for paying distinguished lecturers, by awarding grants to aid scientific investigation by their members, by providing facilities for their meetings at the present place of the Academy, or in other ways that may become practicable.

5. Each society thus affiliated with the New York Academy of Sciences to have the right to delegate one of its members to the Council of the Academy, this delegate being selected from such members of the society as are also members of the Academy, or being made so by his society's paying his dues while a delegate.

6. Societies thus affiliated may at their option indicate on their publications their affiliation with the New York Academy of Sciences.

7. Notices of all meetings or other functions of the Academy and of its sections and of the affiliated societies to be mailed

weekly by the secretary of the Academy to all members and associate members without charge to any affiliated society.

8. Any affiliated society may withdraw from this affiliation, by a majority vote of its members, at a meeting called for this purpose, to take effect three months after official notice of such action has been filed with the secretary of the New York Academy of Sciences.

9. Such an affiliation would render the Council of the Scientific Alliance an unnecessary organization, and it might be merged in the Council of the New York Academy of Sciences, under existing laws.

Slight changes in the wording of the proposition of February 8 were made, as you will see by comparison with my letter of that date, in order to meet points brought up in the discussion, and an additional paragraph was inserted, providing for the withdrawal of societies (paragraph 9).

I was instructed by the Council to transmit the plan thus unanimously approved to the secretaries of the several societies, and to recommend its adoption by them, and also to request that action be taken by the societies and notification of such action be sent to me before the third Thursday in May, the date of the annual meeting of the Council, so that the plan, if adopted, may be carried into effect on or before October 1, 1906.

I would say in this connection that I have submitted the general features of this plan to a large number of persons interested in the scientific development of the city, not delegates to the Scientific Alliance Council, and find it very cordially received.

Yours very truly,

N. L. Britton,
Secretary of the Council.

A motion to adopt the report was made and seconded, and Dr. Britton further explained the plan and its advantages. The motion to adopt was unanimously carried.

Mr. H. A. Gleason presented a paper, illustrated by many photographs, on "Some Phytogeographical Features of the Prairies."

An eastern extension of the great western prairies reaches across Iowa into Illinois and Indiana and portions of the adjoining states. Its flora is characterized by large numbers of western plants, although a majority of the species are of the eastern distribution and constitute a derived element of the

flora. The origin of the prairies has been referred to the character of the soil, the distribution and amount of rainfall, the direction of the prevailing winds, the grazing of bison and to forest fires. Each of these has probably had some influence in accelerating or retarding the invasion of the prairie or forest after the retreat of the continental ice-sheet, but the most important factor of all is historical rather than physical in nature. At the close of the glacial period the territory since occupied by prairies was opened first to invasion from the southwest, a region of climatic prairies, and subsequently to invasion from the climatic forests of the southeast. The two floras, on meeting, adjusted themselves to each other and to the physical factors of the environment, so that the forests occupied the bluffs and valleys along the streams, and the prairies the high lands between them. The climate and soil were adapted to the growth of the forest, so that, until extensive cultivation was begun, the prairie was gradually being displaced.

A comparatively restricted area along the Illinois River is occupied by sand deposits covered with a vegetation essentially similar to that of the sand-hill region of Nebraska, and entirely different from that of the dunes at the head of Lake Michigan.

After an interesting discussion of Mr. Gleason's paper, Dr. Rusby exhibited various plants used as food by the Indians. Among these were young shoots of the cat-tail, specimens of bitter-root used by the Indians of the northwest, and kouse — which consists of several species of *Lomatium* (*L. Canbyi*, and *L. Kous*) and is an important article of Indian diet. Dr. Rusby spoke also of the use by the Indians of the young buds of the beech tree, which are edible, when cooked, at any date after the first of January.

Dr. N. L. Britton exhibited fruits of the palm *Acrocomia media* Cook, recently collected by him in Porto Rico, and remarked on the relationships and distribution of this species, referring to the fine specimen of the plant growing in the palm collections of the Garden, brought by Mr. Percy Wilson from that island several years ago. He stated that his observations on this tree showed that the trunk does not invariably bulge above the base, as

thought by Mr. Cook at the time he described the species (Bull. Torrey Club, **28**: 566), a small proportion of the trees being quite columnar from the base up. He further reported that the *Acrocomia* of St. Kitts, collected by Mr. Cowell and himself in 1901, is identical with the Porto Rico species, and that it also occurs on the French Antilles, as illustrated by specimens received from Père Duss. The tree is altogether different from the spindle-shaped *Acrocomia fusiformis* of Cuba, and seems to be more closely related to the Jamaican *A. aculeata.*

The Club adjourned at 5:15 o'clock.

C. Stuart Gager,
Secretary.

FIELD MEETINGS OF THE CLUB

In a circular recently distributed to members, the Torrey Botanical Club announces an arrangement of the field meetings for the current year so that a part of them will constitute a systematic out-of-door course in forestry. At the regular meeting of the Club, held on Tuesday, May 8, Dr. Grace E. Cooley presented the general subject of forestry in an illustrated lecture. The outlines for the field excursions to be made on Saturday afternoons were prepared by Dr. Cooley in accordance with suggestions made in the lecture. Preceding the field observations, each guide gives a brief presentation of his topic, after which, illustrations of the principles presented are sought in the forest. Six out of ten meetings scheduled have been held this spring. The remainder will be held in the early autumn.

The subject of the first lesson, April 28, was "Characteristics of Trees," with Dr. C. S. Gager as instructor and guide. The prefatory talk was given at the museum building of the New York Botanical Garden, and the field studies were made on the Garden plantations. The individual tree was studied as the unit of the forest. Among the topics considered were: The parts of a tree and their physiological functions; normal shape of stem and crown in forest and in open field, with causes; the relation and development of buds, and their homology and ecology;

kinds of buds; growth in height and girth; reproductive capacity, and reproduction by seeds and sprouts; attainment of economic maturity, and the normal duration of healthy growth. About twenty-five persons were present at this meeting.

The second forestry lesson was given on Saturday, May 5. The party left Chambers Street for Bloomfield, N. J., via Greenwood Lake R. R., at 1:20. From Bloomfield, a walk of about three miles was taken, to Essex, whence the party returned, at 5 o'clock, to New York. The road lay for a considerable distance through heavy forests, chiefly of oak, chestnut and beech. The general subject of the lesson was "Reproduction of Trees." The provisions for securing pollination by insect agency were contrasted with those for wind pollination and the gregarious habits of plants making use of the latter were illustrated. The abundance and fertility of the seed produced by different trees and the relation of these qualities to the size and other characters of the seeds was discussed. Some peculiar methods of seed distribution were referred to. Trees were compared as to the relative frequency with which they produced a crop of seed, and as to the length of time required for the latter to germinate. Propagation by suckers and shoots was discussed as to its causes and occurrence under different conditions and in different countries. Many interesting plants were collected. Thirty-two people were present. Dr. H. H. Rusby was instructor and guide.

May 12, the special subject of the field meeting was "Violets." Twenty-three persons were present, Mr. W. W. Eggleston acting as guide. A couple of hours were spent about the northern end of Van Cortlandt Park near the Yonkers trolley line. Here were found *Viola obliqua*, *V. cucullata*, *V. fimbriatula*, and an abundance of *Viola palmata* and *V. sororia*, with all sorts of intermediates between the last two. Afterwards some of the party returned to Bronx Park and visited the violet bed in the herbaceous grounds of the New York Botanical Garden.

May 19, the third forestry lesson was given on the grounds of the New York Botanical Garden, with Mr. George V. Nash as instructor and guide. The subject was "Characteristics of Trees, illustrated by various species which show strong con-

trasts." Trees were discussed with special reference to climatic requirements, requirements as to soil and situation, and capacity for bearing shade.

On May 26, the fourth forestry lesson was given at the New York Botanical Garden, with Dr. Arthur Hollick as instructor and guide. The subject for observation and discussion was "Seedling Trees — comparison with mature trees." Attention was first directed to the cotyledons — the primitive leaf-forms — which are rounded or elliptical and entire, and to the fact that the first leaves are nearly always simpler than the later mature leaves; in the white oak and red oak, for example, the leaves are at first entire and later lobed; in the ash, simple at first, later compound; in tulip-tree, orbicular at first, later cuneate or emarginate above and lobed. The bark characters of seedlings and older trees were illustrated. The roughening of the bark with age is usually due to growth in diameter of stem or trunk and the consequent rupture of its outer covering, but may be caused by subsequent secondary growth as is seen, for example, in the corky excrescences of the *Liquidambar*.

The Decoration Day excursion, May 30, was to Hempstead, Long Island. Miss Fanny Mulford and Mrs. N. L. Britton were the guides, and fifteen others were present. The first station visited was a *Sphagnum* bog between the kennels of the Meadow Brook Hunt Club and the estate of Mrs. O. H. P. Belmont, where fine specimens of *Drosera rotundifolia*, *Arethusa bulbosa*, *Andromeda Mariana* and *Viola notabilis* were secured. Luncheon was served near Place's Pond where the whorled Pogonia, *Isotria verticillata* was found in abundance and fine specimens of *Arisaema pusillum*. In a white cedar swamp near Merrick, *Dryopteris simulata* and *Woodwardia areolata* and *W. virginica* were found in abundance, also fruiting specimens of *Mnium hornum*.

NEWS ITEMS

Professor Ludwig Loczy has been commissioned by the Royal Hungarian Natural History Association to devise a plan for an extensive botanical survey of Hungary.

Dr. William A. Murrill, first assistant of the staff of the New York Botanical Garden, sailed for Naples on May 29. He carried with him numerous specimens of American fungi for comparison with types in European herbaria. He expects to return to New York about the middle of August.

Mr. Edward W. Berry, of the Geological Survey of Maryland, has been appointed assistant in palaeontology in Johns Hopkins University. He will spend six weeks this summer in field work in North Carolina under a special commission from the United States Geological Survey in coöperation with the Geological Survey of North Carolina.

Mr. W. J. Morse, assistant professor of bacteriology in the University of Vermont, has been appointed botanist of the Maine Agricultural Experiment Station at Orono, and will begin his new duties on July 1. Professor Morse's work at the University of Vermont will be divided between Mr. H. A. Edson, instructor in botany and bacteriology, and Mr. N. J. Giddings, botanical assistant in the experiment station.

At the one hundred and fifty-second commencement of Columbia Univerity, held on June 13, the degree of doctor of philosophy was conferred upon four candidates in botany, the recipients and the subjects of their theses being as follows: Howard James Banker, "A Contribution to a Revision of the North American Hydnaceae"; Ira Detrich Cardiff, "A Study of Synapsis and Reduction"; Henry Allan Gleason, "A Revision of the North American Vernonieae"; Charles Budd Robinson, "The Chareae of North America."

The twelfth annual field meeting of the Vermont Botanical Club will be held on Mt. Mansfield July 4 and 5. The flora of this mountain, the highest of the state, is of special and well-

known interest, and a cordial invitation is extended to botanists of neighboring states to be present and assist in making the excursion a memorable one. Those planning to attend may obtain information as to details of the meeting by addressing Professor L. R. Jones, Secretary Vermont Botanical Club, Burlington, Vermont.

The American Association for the Advancement of Science will hold a summer meeting at Ithaca, N. Y., June 28 to July 3, 1906. The meetings of Section G, Botany, will be principally for field work. On Friday, June 29, there will an excursion to Fall Creek and the Ithaca Marshes, led by Dr. K. M. Wiegand; on Saturday, June 30, an excursion to the ponds and bogs of South Cortland, led by Dr. Wiegand, Dr. Durand, and Professor Atkinson; on Monday, July 2, an excursion to Enfield Gorge, led by Dr. E. J. Durand; on Tuesday, July 3, if desired, an excursion to the moors at Junius. The American Fern Society and the Society for Horticultural Science will meet in affiliation with Section G.

As already announced in the May number of TORREYA, the third annual field "Symposium" in which the Philadelphia Botanical Club, the Washington Botanical Club, and the Torrey Botanical Club will coöperate, will be held at Mountain Lodge, Little Moose Lake, Old Forge, N. Y., from July 2 to July 9. Through the courtesy of the Adirondack League Club, the privilege of occupying its club house for one week is extended to members of the Symposium. Little Moose Lake is in the midst of the interesting Adirondack flora and a highly profitable outing is anticipated. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. R. Single fare from New York City, $6.46. Board, $2.50 to $3.00 a day. Stages will meet the party at Fulton Chain Station. All who expect to attend are requested to notify Mr. Joseph Crawford, 2824 Frankford Avenue, Philadelphia, Pa.

Vol. 6 No. 7

TORREYA

July, 1906

A HISTORICAL SKETCH OF THE DEVELOPMENT OF BOTANY IN NEW YORK CITY

By Henry H. Rusby

(Continued from page 111)

Dr. Thurber, our first president, was characterized by profound conscientiousness and great determination. He began life as a pharmacist, in Providence, and developed a strong leaning toward chemistry, of which subject he became a teacher. His love of botany grew out of his study of drugs. In 1850 he went as botanist, quartermaster and commissary to the Mexican Boundary Commission, the botanical results of which were published by Torrey in 1859. He received the degree of A.M. from Brown University, and the honorary degree of M.D. from the University Medical College, of this city. He was in the U. S. Assay Office for two years and left from motives of honor. He was at various times a teacher in Cooper Union, the New York College of Pharmacy and Michigan Agricultural College, and was president of several horticultural societies and of this Club until 1880. For twenty-two years he was editor of the *American Agriculturist*, in which capacity he exerted an influence over the character of young people, in the agricultural sections of the country, that was and is of great national importance. His most important contribution to botanical work was perhaps the maintenance of a botanical garden at Passaic, New Jersey, in close relations with that of Harvard. His private fortunes were melancholy. Captured by the whirl of speculation in real estate that followed the civil war, he purchased land at an excessive price, and spent the rest of his life in a painful struggle honorably to discharge his financial obligations.

[No. 6, Vol. 6, of Torreya, comprising pages 101–132, was issued June 20, 1906.]

Mr. Wm. H. Leggett, our editor until near the time of his death in 1882, was a distinguished and successful educator, maintaining a private school in the upper part of the city. He was described as a "profound classical scholar," making a specialty of Greek. Notwithstanding this predilection, he managed to perform his botanical work in a most creditable manner, and exerted a persuasive influence in interesting the young in this study. It must not be overlooked that in founding our *Bulletin* he assumed the financial responsibility for its success.

Professor Alphonso Wood will be ever remembered by American botanists as the author of descriptive floras of the highest scholarly character, and put together with a rare regard for educational principles. Those who are fortunate enough to have owned and carefully used his books will recognize, in the light of our present advancement, that his knowledge of plants was more full and accurate than that of most of our American botanists who have written similar works. His life was not a happy one. The influences of prestige and station were deliberately turned against him, and he was to a great extent suppressed. The manuscript of his Class-book was used by him in teaching, and steadily perfected, for ten years before its publication, which was very successful. His work in life was that of an educator. He taught in and presided over a number of institutions, and brought educational and financial success wherever he went. In 1865 he made an overland botanical journey to California, then to Puget Sound, and home by way of the Isthmus. The specimens and observations accumulated on this journey were very valuable, but have never been systematically studied. He was professor in the New York College of Pharmacy during the two years preceding his death, in 1881.

Mr. Coe F. Austin was born at Closter, N. J., in 1831, and died in 1880. His chief characteristics were a marvelous energy and capacity for work, and great independence and originality in selecting his lines. His energy was closely confined, so far as general botany was concerned, to the local flora, and no other man has done so much to make known the flora of northern New Jersey. He was at the time one of the very few local

workers in bryology and practically our only close student of the Hepaticae. Unfortunately, his botanical zeal caused his family to be deprived of many of the important possessions of this life.

Mr. M. Ruger, who died in 1879 at the untimely age of 44, was in many respects a memorable character. His physical constitution was so weak that he could never attend school, nor engage in any vocation, yet he succeeded in acquiring a very liberal education, and in pursuing the avocation of botany until he came to be known as the Club's "walking encyclopedia." His knowledge of the local flora was remarkably full and remarkably accurate, and before he died this knowledge was extended over a large part of the country. Not only did his observations enrich the proceedings of the Club and the pages of the *Bulletin*, but his collections did much to build up the Club's herbarium. His work was notable for extending into such fields as that of mycology, then almost unworked, and for many years all questions arising in the Club relating to fungi were habitually referred to him. He was stricken down while botanizing and died two days later.

Professor Joseph Schrenck was a school principal in Hoboken, who applied his scholarly tastes and abilities to the study of botany in ways then little known among us, and he labored diligently and with great patience to lead others in the same direction. He obtained a professorship to do evening work in the College of Pharmacy. This work, along strictly technical lines, led him to a deeper study of plants, both anatomical and physiological, by the use of the microscope and chemical reagents, than that which then prevailed here. From this experience he was soon led to deplore the superficiality of current work, and he started private classes among the Club's members for interesting them in methods which he saw must soon become dominant. Although general tendencies were not thus changed, many persons were interested, and some of our best workers of the present day acquired their first training in this direction from these humble efforts of Professor Schrenck.

During the same time another worker, Professor E. H. Day,

who reminds us of Schrenck in some ways, was active in similar work at the City Normal College. Tied down by the unceasing drudgery of wholesale elementary teaching, he might have been pardoned for falling into the rut and then into the slough, but on the contrary, he kept both his interest and his activity fresh, and he was ever alert in inspiring his students with a love of the subjects studied, which might lead them later to continue their studies as amateurs. In 1883, while occupying the chair at a Club meeting, he suggested the appointment of a sub-section for the study of physiological botany. A committee was appointed, consisting of Messrs. Hyatt and Britton, and Miss Knight, now Mrs. Britton. This was perhaps a very important historical event.

Dr. Timothy F. Allen had one of the longest uninterrupted careers as a member in the annals of the Club, extending from its foundation to 1902. During the early part of this career he was very active in the meetings and in all the work of the Club, and later he developed an interest as a successful investigator of the Characeae. His later life was an intensely busy one in the field of medicine, both as a practitioner and teacher, and his botanical activity was to a great extent crowded out, but he never lost his interest in the Club, nor did he ever fail in his readiness to respond to any special call for coöperation.

Mr. Wm. H. Rudkin was an active down-town business man, who lent his fine abilities to the financial management of the Club as its treasurer for many years when this duty required faithfulness, tact, sacrifice and responsibility. He was by no means wanting in botanical acumen, nor failing in activity, but it is in the capacity above mentioned that he is to-day deserving of our special remembrance and gratitude.

Dr. Emily L. Gregory, though not one of the older members of the Club, exerted a profound influence upon its character and upon that of botanical work in the city. Thoroughly educated in the best modern schools of Germany, and especially a disciple of Schwendener, she became here a missionary of advanced work and methods. She founded the botanical department of Barnard College and established there a botanical center which has since

steadily grown in strength and influence, and is now one of our most important botanical possessions.

It has been seen that the work of the Club was at first narrow as to the subjects involved, because the science itself was so, especially in this country. It continued afterward to retain this character, largely by force of habit. It is not true, however, as has been generally accepted, in response to the criticisms of those who did not know, that its work was confined to accumulating and naming specimens, enumerating circumscribed floras and studying individual structures. Its work was the study of living manifestations of plants in the field, a study which has of late been largely eliminated, to the very great misfortune of science, as here pursued. There came a time when New York experienced an invasion of botanists with concepts, knowledge, interests and methods which were largely foreign to us. Their importations were of incalculable value to New York, and at the same time most urgently needed, and resulted in giving to us a new, modern and broad botany. The event was not, however, free from unfortunate incidents. Laboratory work was given undue prominence. Ecological and other field work came to be largely neglected, and what might not inappropriately be called the disjointed period of the Club's history ensued.

With a few closing remarks, the history of the Club must be dismissed from further consideration. Its publication work has steadily increased, until it now includes three periodicals, the smallest much larger than was the *Bulletin* until many years after its commencement. It has published catalogues of plants of local and distant areas, monographs of important groups, and results of important anatomical, physiological and economic researches. It has collected lists of works and workers, and maintained indoor scientific meetings, at first one, then two monthly, and delightful, and on the whole, very profitable, field meetings, hereafter to be conducted on a systematic basis not previously attempted. It has conducted elementary courses of instruction, and given lecture courses. Its work has included every part of the vegetable kingdom, and covered almost every part of the world. Its influence in securing the establishment of our present botanical garden may next be considered.

So eager was the desire of the early members of the Club to observe how plants lived, that many of those able to own gardens ignored vegetables and flowers, and maintained little botanical gardens at their homes. Mr. Wm. Bower, for example, was a hard-worked die-cutter of Newark, yet he managed to accumulate, in his little city yard, a choice collection of native and foreign rarities. These statements relate to a period when the most generous botanizing grounds were still within easy reach of everyone, some of them existing even in the heart of the present city.

As succeeding decades of extending settlement destroyed the localities which had been so greatly prized, not only in the remote parts of the island but in the country round about, these people not only mourned their present loss, but were alarmed by the handwriting on the wall, and the demand for a botanical garden arose independently in the mind of every botanist, professional and amateur. So early as 1874 the Club appointed a committee to act with the New York Pharmaceutical Association in requesting the city to establish such a garden in Central Park.

As the educational side of our work grew in importance, and especially in breadth, and as the student body doubled and redoubled, the cry for the garden grew equally loud from that direction, and continued until at length it was satisfied. The great value to Harvard and its work of the well-managed plot that it utilized in this way was appreciated and often discussed at the little meetings which gathered around the old pot-stove in Professor Newberry's room, during his presidency of the Club.

Under the influence of Columbia's progress, as already described, it appreciated this want as much, probably, as any other of our botanical elements. Its peculiar relations to the former Elgin Garden were recalled in the public press. A contributor to the New York *Herald*, of November 26 and 27, 1888, made an earnest appeal for the recognition by the city of this great want. Dr. Arthur Hollick, to whose faithful and self-sacrificing work as secretary, our Club largely owed its strength for a prolonged period, directed our attention to these articles and proposed that he write an official letter to the *Herald* endorsing them. Such a letter was authorized, and it appeared on Decem-

ber 2 following. A committee was appointed consisting of Dr. Hollick, Mr. E. E. Sterns, and Professor Newberry, to deliberate and report to the Club whether it were advisable for us to take any action for the furtherance of this movement. The possibility of the realization of our long cherished hopes now began to take possession of our minds, yet without any very strong hope being entertained. The Club had no political influence and little acquaintance with those financial interests, the aid of which was rightly deemed to be essential to success. As it resulted, however, some of these men were led to interest themselves in the proposition, largely through the influence of Judges Addison Brown and Charles P. Daly, and of Mr. Charles F. Cox and Mr. Wm. E. Dodge. For a long time the idea was regarded with favor in influential circles, but without any definite steps being taken to execute it. Finally, it was remembered that all history teaches that when you have wearied of discussing a project, and are at length really resolved to carry it out, you must call in the assistance of the women. So a ladies' committee was appointed and held a memorable meeting at the residence of Mrs. Charles P. Daly, which some of the men, your favored speaker among them, were graciously permitted to attend. This influence, while but one of many, each of which was necessary to success, seemed to give the final impetus needed. Mr. Cornelius Vanderbilt assumed the financial and executive management of the enterprise, and the stage of organization was reached.

One element in the success of the Garden that has already shown itself to possess a value beyond price, and which is certain to do so with increasing clearness in the future, is the protective influence of its charter. Born of the learning, long and wide experience and ripe judgment of Judges Brown and Daly, and occupying their attention for considerably more than a year before they were willing to regard it as satisfactory, it seems to provide for every important contingency that it was possible to foresee, and it promises a safety, permanence and stability that are too often wanting in similar organizations.

To enter upon a discussion of the personal credit due in the membership, the board of managers and of scientific directors, and

in the Garden staff, would be an agreeable pleasure, but I must confine myself to the very earnestly made remark that the great success of the Garden has been due to the love of the institution and its work which has animated all concerned in it. It is this which has lent faithfulness, earnestness and energy and has incited to many acts of great sacrifice. If it could ever be said of any similar institution, we are able to say of this that it is a monument of loving service, in which work has been accepted in considerable part as its own reward. This is wholly true of Mrs. Britton's work in building up one of the most important departments of bryology in existence.

I dare not enter upon a detailed history of the Garden's development, and it has been so often and so recently recorded that I do not deem it necessary. An excellent account of its organization and of Columbia's relation to it, by Professor Underwood, can be found in the *Columbia Quarterly* 4: 278. 1903. Our charter was secured in 1891 and was amended in 1894. It was agreed upon that 250 acres of park lands should be set apart for our use and $500,000 appropriated for the museum building and conservatories, as soon as an endowment fund of $250,000 was obtained. This fund was completed in 1895, Columbia University making the first subscription of $25,000. With the election of Dr. N. L. Britton as Director-in-Chief, and his selection of a working staff, the preparations were complete and work began in 1896, the event which we are to-day celebrating. This was the year in which the first part of Britton and Brown's Illustrated Flora was published. Ground was broken for the Museum Building in December, 1897, and for the conservatories in 1898. The Museum was opened in 1899. In 1898 the bulk of the herbarium of Columbia College, numbering nearly half a million specimens, and of its botanical library, including more than 5,000 bound volumes, was turned over to the Garden, in trust and for its use, under certain stipulated conditions. Since then the herbarium has been more than doubled, and the library has been enlarged to 18,000 volumes. A vast amount of grading has been done, many miles of walks and roadways built, bridges erected, and a great increase in all the collections has been made.

Besides the *Bulletin* and the *Journal*, regularly published, the Garden has entered upon a work of a much more ambitious character. Utilizing the David Lydig fund, bequeathed by Judge Daly, it has begun the publication of an elaborate "North American Flora," the first parts of which have already been published. Provisions have been made also for the publication of colored plates of American plants.

Among the very important undertakings maintained have been extensive explorations, not only in the United States proper, but in such distant regions as the West Indies and the Philippines. A tropical station is maintained in Jamaica for the convenience of visiting botanists. At the Garden a scholarship fund is maintained, by which it is rendered possible for investigators desiring to pursue important studies here to be supported for a limited period.

A bird's-eye view only is permitted us of the botanical forces at present active in our city, including schools and classes, societies and botanical gardens and parks.

Botanical instruction, in the form of nature study, is now an integral part of our elementary school system, and is continued, in one form or another, in the higher grades. Spring and fall lecture courses and object teaching are conducted at this Garden for the benefit of the grammar schools of the Bronx, and it is to be hoped that provision may soon be made for extending the opportunity to the other schools of the City. Systematic instruction for the botanical training of teachers is given at the City Normal College, Teachers College, in the pedagogical department of New York University, and by the Brooklyn Institute of Arts and Sciences. Important work in the same direction, as well as in that of original research, is conducted at the summer school of science at Cold Spring Harbor. Columbia University provides ample and exceedingly varied botanical work in its different departments. Botanical teaching at the College of Pharmacy, now a department of Columbia University, dates back almost to the beginning of the College, in 1829. Although its work is technical, an effort has always been made to keep in sight its scientific basis.

At Columbia University itself, the department of botany is in

charge of Professor Lucien M. Underwood, one of the most eminent, critical and conservative of botanical investigators, who has been accorded the status in universal botany that he merits. The bulk of the instruction work is under the immediate care of Dr. Carlton C. Curtis, and none better is given in any modern university. It seems most unfortunate that Dr. Curtis's great work should not be more generally known and more definitely recognized. This work is most ably supported by Professor Herbert M. Richards and Dr. Tracy E. Hazen in Barnard College, the department for women, which corresponds to Columbia College, for men. The instruction work at the New York Botanical Garden is of the most advanced character. Only those who have demonstrated their ability to pursue original investigations are admitted, and these are expected to engage while here in work of that character. More than half a hundred such pieces of original investigation have been conducted here in a single year.

Of local societies engaged in botanical work we have a number which are mere private associations, of a few persons, without formal organization, besides others to be mentioned. We have also a number, like the Linnaean Society, the Brooklyn Institute, the Staten Island Association of Arts and Sciences, the Bronx Society of Arts and Sciences, the West Side Natural History Society, and the local chapter of the Agassiz Association, which are engaged in the general pursuit of science, of which botany forms a part. Those devoted solely to botanical work of some sort are the New York Horticultural Society, which holds meetings, conducts lecture courses, and gives exhibitions, with the award of prizes; the Hulst Botanical Club of Brooklyn, a distinctly amateur organization; the Botanical Club of the Normal College, which aims to stimulate in its students and graduates a love of study, outside of that required by the regular course of instruction; and the Barnard Botanical Club, a somewhat similar organization, which aims to keep alive in the graduates a regard for the interests of the botanical department of that college, holds annually two regular meetings and provides one public lecture, and to which students of Barnard are eligible as members, after having performed one year of botanical work at the college.

Lastly, there is the Torrey Botanical Club, which endeavors to act as a central organization, representing in its membership that of all the other active botanical organizations in the city. Its present active membership numbers about 250, having increased 25 per cent. during the present year. It publishes three periodicals, holds two in-door meetings monthly, between October and May inclusive, and field meetings each Saturday during the season of plant growth. As has already been stated, an interest in plants from any point of view is the only botanical qualification required for membership, the nomination being made by some member of the Club and approved by the committee on admissions.

Among botanical gardens, it is not out of place for us mentally to include all the numerous and extensive horticultural establishments which abound in and about New York, among the stock of which is to be found such a great variety of plants of interest from botanical considerations. The public parks of this city are also to be justly regarded as affording important advantages for botanical work. Active and enthusiastic botanists are connected with them, and the planting, labelling and exhibiting are conducted with a view to interesting the public in the scientific basis of the work. The great collection of North American woods at the American Museum deserves special mention. People in this city who are interested in such subjects should also make themselves acquainted with the elaborate park system of Essex County, New Jersey, which has been laid out and organized with studious regard to future conditions and needs, and will undoubtedly develop important botanical features as time goes on.

Our own Botanical Garden you are to inspect to-day under unusually favorable circumstances. Even this, however, will give you but a very inadequate idea of the breadth and depth of its organization and character. There is scarcely a department of botanical work for the development of which provision is not made, the several departments being under the care of accomplished specialists. As you go about the grounds and enjoy the beautiful grades, the roads, walks, and bridges, you perhaps do not realize the immensity of the task involved in bringing them

into existence and at the same time establishing and developing the scientific, cultural and educational departments. From the time of its foundation, the Garden has had more than one interest clamoring loudly for the expenditure of every available dollar. Its economical and efficient management has usually contrived to divide that dollar and make each part of it do the work of the whole.

In the conduct of any growing enterprise not only does each step taken become a new point of departure, but new centers of work become established by the division of the old; and so our review would not be complete without a glance at the most important requirements for the future. One of these is the organization of a well-equipped botanical department at New York University. One of the leading universities of the country, with well-organized departments and many hundreds of students, it seems a continued misfortune that it should not be in a position to utilize the many facilities which we have to-day considered, and equally so that our science should not profit by the stimulus and support which would result from the maintenance of an adequate center of activity at University Heights.

Our Botanical Garden suffers greatly from the want of a larger endowment fund. Its charter provides for the construction and maintenance of its framework, but back of this lies the necessity for supporting its higher life, and for this support we must naturally look to its endowment. The two should keep close pace. The crown of the greater tree demands a greater root system for its support. Our plant has increased wonderfully in ten years, both in size and in the intensity of its activity, while the endowment has remained stationary. Its increase to the sum of $1,000,000 has been undertaken, and the amount is none too large and can come none too quickly. One of the special needs of the Garden, or rather of this part of the country through its Garden, is a department of forestry. From an economic point of view, this is by far the most important department of botany at the present time. Our need of increased forest resources is already alarming to every serious political economist. When an attempt is made to provide them, we find that we do not know

how ; that every tree must be known separately, and that until this is done practical operations must fail ; and that the acquisition of this necessary knowledge is as slow as the growth of the trees themselves. It is urgently necessary that such centers of investigation should be established in numbers. Scarcely anywhere is there an institution that combines so many advantages for a successful organization of this kind as here. Our Club has this year undertaken to arouse interest in the subject by providing a course of ten field lessons, conducted by competent instructors, and open to all our members, without charge.

Did time permit, I should be glad to speak on this occasion of the special needs of our Club. In a general way we should get back to the work for which we were originally organized — the study of our local flora, at present construed as that within a 100-mile radius of this city. To do it properly provides ample work for years to come. It is a work of important scientific value, yet includes popular features calculated to interest every member. All that is needed is a leader, and this is the point of difficulty. He must be a capable botanist, and he must give practically his whole time to the work. This means that he must be compensated, and this is possible only through an endowment fund, or through a very large membership list, for both of which we earnestly hope. If 200 others of the 10,000 or more persons of this section whose interest in plants entitles them to become members of the Club would do so, there would be ample provision for the undertaking of this work.

DOCTOR TORREY AND DOWNINGIA

By Edward L. Greene

In the course of my work, as the earliest pioneer of the movement in this country for priority in nomenclature, I met with no other synonym at that time usurping the place of a generic name which I was more reluctant to indicate as a mere synonym than Doctor Torrey's *Downingia.* It is a group of elegantly beautiful little plants ; such a genus as might most aptly commemorate

in botany the name and services of a man so rarely accomplished in dendrology and the noble art of landscape-gardening as Andrew Jackson Downing.

Moreover, Doctor Torrey's occasion for thus honoring Downing in the proposed name for this particular genus was an interesting one, and particularly instructive in its bearing upon the principles of botanical nomenclature; all the more interesting since it reveals him as acting firmly, vigorously and without hesitation upon what he regarded as an intolerably vicious innovation in nomenclature, and this at a time which antedates all legislation, so-called, on the nomenclature of botany.

The genus which Doctor Torrey wished should bear the name *Downingia* had, to his knowledge, been twice named already. At the moment of his writing it was currently received as the genus *Clintonia*. He knew that, because of the existence of that name as applied to another genus of earlier date, the present *Clintonia*, as a name, was null and void. He was also aware that an eminent botanist in Europe, while attempting to displace the homonymous *Clintonia*, had made matters worse rather than better by dedicating this also to De Witt Clinton under the name *Wittia*; so that by this curious arrangement Clinton would have commemoration in botany by two genera, *Clintonia* Raf., and *Wittia* Kunth. Doctor Torrey, therefore, governed by that mere good sense which had precluded from the minds of all great botanists before him for two thousand years the very idea of dedicating two genera to one man, proposed the new name *Downingia* for Lindley's *Clintonia* and Kunth's *Wittia* in the same confidence with which he would have assigned the new name to an entirely new and nameless generic type. In the Pacific Railway Report, already cited by me in various places, his comment on the action is this: "It would be inadmissible to bestow two genera on the same person."

At the time of his writing Doctor Torrey must have been unaware that *Downingia*, even when newly published, was at once a synonym by virtue of Rafinesque's *Bolelia* and *Gynampsis*.*
But the moment has seemed opportune for bringing to the notice

*See Pittonia, 2: 124.

of those enrolled for work under the patronage of Doctor Torrey's name, the example of his own way of dealing with such names as *Wittia*, *Porteranthus* and *Neowashingtonia*.

NATIONAL MUSEUM,
WASHINGTON.

TWO NEW DEWBERRIES OF THE HISPIDUS GROUP

BY W. H. BLANCHARD

The first is a dewberry and belongs to the *Hispidus* group, but it is very distinct from anything yet described. I propose to name it

Rubus jacens sp. nov.

Small-stemmed glabrous-leaved plants with five thin, narrow leaflets, slender prickles, glanded hairs, late flowers, nearly prostrate and tipping freely.

New canes. — Stems decumbent at first, eventually nearly prostrate, 2 to 3.5 feet long, slender, terete, red above, green below, generally unbranched, without pubescence, tipping early in September. Primary prickles slender, slanting backward, set at random, about 20 to the inch of stem; secondary prickles smaller and weaker, quite as numerous, shading to tapering hairs tipped with small glands. Leaves delicate, thin, 5-foliolate, dark yellow-green above, light-green below, glabrous. Leaflets narrowly oval, long-pointed, wedge-shaped at the base, finely and somewhat doubly serrate (not serrate-dentate), the middle one about 2 inches long, the others smaller. Petiole and petiolules slender, grooved above, with slender, hooked prickles and a few glanded hairs; the petiolule of the middle leaflet 0.5 inch long, the side ones short, and the basal leaflets sessile.

Old canes. — Stems prostrate, prickles and glanded hairs considerably impaired, no old leaves remaining. Second year's growth entirely of leafy, erect branches or stemlets tipped with inflorescence, one from the axil of each old leaf. Axis of stemlets zigzag, terete, slender, faintly pubescent, with a few weak prickles and glandular hairs. Leaves 3-foliolate, pointed, cuneate at the base, sharply and in part doubly serrate, color and texture like those of new canes. Inflorescence a short raceme 1.5 inches long, prickles few and weak, glanded hairs few, pubescence faint, pedicels slender, 8 to 12, set at nearly a right angle to the axis, subtended by small bracts or often large ones, passing to small

unifoliolate leaves. Flowers small, 0.87 to 1 inch broad, petals one half as wide as long. Fruit globular, black, sweet and pulpy; drupelets rather large, more than 0.12 inch in diameter, 1 to 10. Flowers late in June, fruits late in August.

Type station, Alstead, N. H. Abundant over the large Bellows Pasture on Signal Hill, two miles north of Forester's Mill. On open land in dry ground. This is the only place I have found where this dewberry grows, though a friend brought it to me from a neighboring pasture. I first found it July 16, 1902, and have collected it several times. Like *Rubus hispidus* L., it is a slender plant and tips well; but that species is 3-foliolate and has thick, shining, broad, short-pointed, cuneate-dentate leaflets which survive the winter, and hispid bristles rather than weak prickles, hugs the ground and branches freely, and in many other ways is nearly the opposite of this species.

The second dewberry is also of the *Hispidus* group and has a considerable resemblance to *Rubus jacens.* It is named and described as follows:

Rubus cubitans sp. nov.

Plants prostrate, glabrous, nearly destitute of prickles, bristles or glands, 5-foliolate, with thin, narrow, pointed leaflets, not surviving the winter.

New canes. — Stems slender, prostrate, 2 to 5 feet long, terete, red, glabrous and glandless. Prickles few, weak, set at random, slanting backward. Leaves small, 5-foliolate, glabrous, bright green on the upper surface, a little lighter on the lower. Leaflets narrow-oval, long-pointed, wedge-shaped at the base, finely and doubly serrate-dentate. Petiole and petiolules slender, grooved above, with slender, hooked prickles, the petiolule of the middle leaflet about 0.5 inch long, those of the side ones short and the basal leaflets sessile.

Old canes. — Stems killed back but little. Second year's growth entirely of leafy, erect branches or stemlets 4–6 inches long, tipped with inflorescence, one from the axil of each old leaf. Axis of branches zigzag, terete, slender; prickles very few and very weak. Leaves 3-foliolate, the leaflets broad-oval, rounded at the end, in color, serration and texture similar to those on the new canes. Inflorescence a broad raceme 2 inches long with 8–12 long, slender pedicels, glabrous, with occasional weak bristles and glanded hairs, subtended by rather large bracts.

Flowers 0.87 inch broad, petals narrow, one half as wide as long. Fruit small, globose, black, little maturing. Flowers before the middle of June, fruits early in August.

Type station in the southeastern part of Westminster, Vt., in the mowing and pasture surrounding the house of Geo. N. Banks. In dry or rich places, open ground.

I have known this plant since 1901 and have watched it closely. It seems to be a distinct species, but I do not know how widely it is spread. The detailed description gives it very little in common with *Rubus hispidus* L. and it is much earlier, blossoming two weeks before that species, when growing side by side.

Westminster, Vermont.

SHORTER NOTES

Galactia Odonia Griseb. — In his monograph of the West Indian Galactias, published in the second volume of "Symbolae Antillanae," Professor Urban states (p. 334) that he has not seen this species, no specimen being found in the herbaria of Göttingen, Kew, Cambridge or the British Museum; he therefore makes no disposition of it. A specimen is preserved, however, in the Columbia University herbarium, coming there in the collections of Professor Meisner, of Basle, presented by Mr. John J. Crooke; it is a type or cotype, bearing the number 864 of the collector, Rugel, who obtained it in western Cuba, and it enables me to reduce the species to the Cuban and Bahamian *Galactia rudolphioides* (Griseb.) Benth. & Hook., the earlier specific name.

N. L. Britton.

A new southern Convolvulus. — It is generally understood that *Convolvulus Sepium* L. is an introduced species in America, and that in *C. americanus* (Sims) Greene, we have a closely related but indigenous species. *C. repens* L. of the southern states exhibits variations which, when they are better known, may be recognized as species. The species described below shows relationship toward both *Convolvulus americanus* and *C. repens,* but is so distinct from either in the character of its indument that I venture to describe it as new.

Convolvulus sericatus sp. nov.

Annual: stems twining, 50–100 cm. high, tomentose above, usually glabrous only at the base: leaf-blades oblong-ovate, acuminate, somewhat hastate-cordate, green but finely appressed silky-pubescent above, white beneath with a very dense silky-tomentulose indument, 6–8 cm. long, 2.5–6 cm. broad near the base; the rounded basal auricles not spreading, 1–1.5 cm. long; petioles about half as long as the blades, tomentose: peduncles surpassing the subtending leaves, 7–11 cm. long, tomentose like the petioles; bracts equal, ovate, acute, 2.5–3 cm. long, tomentose without, glabrous within: sepals lanceolate, 11–13 mm. long, glabrous, the evident midvein ending in a minute cusp at the apex: corolla pure white, funnelform, 5–6 cm. long, the limb as broad or slightly broader: capsules about 1 cm. in diameter.

Georgia; near Rabun Bald, Rabun County, in thickets along mountain sides, 3,500–4,000 feet altitude, June 4, 1906 (*no. 2270*). The type is divided and deposited in the herbaria of the U. S. National Museum and the New York Botanical Garden.

The plant is conspicuous on account of its pure white flowers and white indument of the foliage and younger parts. It appears to be perfectly indigenous to the region and does not occur in the few small cleared fields in the valleys and coves. In color and shape of the corolla only does *Convolvulus sericatus* resemble *C. repens*, which is sometimes a twiner, but has smaller, glabrous, and more obtuse bracts than *C. sericatus*. In shape of leaf-blades and in habit *C. sericatus* resembles *C. americanus*.

HOMER D. HOUSE.

CLEMSON COLLEGE.

REVIEWS

De Vries' Species and Varieties, Second Edition*

The first edition of de Vries' "Species and Varieties: their origin by mutation" having been exhausted within a year from the time of its publication, a second edition has been issued. The tone of the reviews of the first edition indicated the general favor which the work met among scientific men and predicted the reception it has had. It is gratifying to see a work of high sci-

* De Vries, Hugo. Species and Varieties: their origin by mutation. Second edition corrected and revised. 8vo, pp. xviii + 847. *Frontispiece.* Chicago: The Open Court Publishing Company. 1906.

entific merit meet such an instant demand, and all science benefits by the diffusion of such a work among the general reading public. Although the text of the new edition is essentially that of the first, the occasion has been used to correct the typographical errors that marred the beauty of the first edition, and to remove certain ambiguities of expression which had escaped the editor's notice in the preparation of that edition. A note is added on p. 575 explaining that the species used by de Vries as "Oenothera biennis" is not *Oe. biennis* as it is known to American botanists, and has not yet been found in nature in America. The insertion of an excellent photogravure of the author adds much to the artistic and sentimental value of the book, and the publishers are to be congratulated on the pains they have taken to make this second edition even more valuable and attractive than the first. There can be no doubt that it will continue to have a large circulation and to diffuse scientific knowledge of advanced character beyond the limits usually reached by scientific works.

GEORGE HARRISON SHULL.

Pfeffer's Physiology of Plants*

This volume, published on March 14, 1906, marks the completion of Professor Ewart's English translation of Pfeffer's *Pflanzenphysiologie*. Volume I, dealing with metabolism, appeared in 1900, and Volume II, on growth, reproduction and maintenance, in 1903.

Volume III treats of movement; the production of heat, light and electricity; and the sources and transformations of energy in the plant. The sense of the original and difficult German has been admirably preserved in the English rendering, though it is not always easy to tell just where the author leaves off and the translator begins.

In the matter of style, the text usually gives universal for partial negatives, as, *e. g.*, on page 307, where it is stated that, "All

* Pfeffer, W. The Physiology of Plants. A Treatise upon the Metabolism and Sources of Energy in Plants. Second fully revised edition, translated and edited by Alfred J. Ewart. Vol. III. Pp. viii + 451. *f. 1–70.* Oxford: At the Clarendon Press. 1906.

motile organisms do not show shock reactions," etc. And so throughout the book, though the meaning is usually obvious, this illogical form of expression is much too common in scientific writings.

Close adherence to accurate terminology frequently arrests the attention of one accustomed to looser nomenclature. Thus Darwin's term "nictytropic" becomes *nictynastic*. The suffix "tropic" (tropism) is rigidly reserved for responses to unilateral stimuli, while, for responses produced by diffused stimuli, the ending "nastic" (nasty) is used.

Chapter I is a general discussion of movement. Chapter II is entitled Movements of Curvature. Under this head are discussed autonomic (*i. e.*, spontaneous) movements; twiners and climbers; movements due to mechanical and chemical stimuli; and aitionastic (photonastic, thermonastic, and hydronastic) curvatures; Chapter III is given to tropic movements; Chapter IV to locomotory and protoplasmic movements; and Chapter V to the production of heat, light and electricity. The sources and transformations of energy in the plant are discussed in the sixth and last chapter.

An appendix is devoted to "some important facts not mentioned in the first two volumes" and to "a summary of the more recent literature." The historical résumés, which were a feature of the first two volumes, also enhance the usefulness of this one.

Besides the intrinsic value of the text itself, the copious references throughout serve to put one *en rapport* with most of the existing literature on the subject. The American reader can hardly help noticing the absence of citations of the work of his own countrymen, scarcely more than three or four American authors being referred to in the bibliographies. This is due partly to oversight of existing literature, and partly to lack of productive scholarship in America. The bibliography, like most others in biologic science, is a tribute to German scholarship.

One's attention is somewhat jarred by reading on pages 64–65 that "A tickling sensation is awakened in the epidermis of man and of tendrils," etc.

It is difficult, however, to make adverse comment because the volume offers so few opportunities.

The translator's emphatic position against unnecessary multiplication of terms will meet with a warm welcome from most readers. The case is made especially strong by such suggestions as "physieclexis," for natural selection; "plaster-of-Paris-cleistogamy," in connection with thermo-, photo-, and hydrocleistogamy; and "paralleloheliotropocampylostrophismic (tortismic) irritability" to describe an organ that "partly twists and partly curves towards the light."

The sincere thanks of all English and American botanists are due to Professor Ewart for making the work accessible in their own tongue. The most comprehensive, and doubtless, also, the most authoritative treatise on the subject in German, this work in its translation easily assumes a similar position in botanical literature in English. It is a monument alike to translator and to author.

C. Stuart Gager.

PROCEEDINGS OF THE CLUB

May 8, 1906

The meeting of May 8, 1906, was held at the American Museum of Natural History at 8 P. M. President Rusby was in the chair; 15 persons were in attendance.

After the reading and approval of the minutes of the previous meeting, the following persons were nominated for membership: Miss Elizabeth Billings, 279 Madison Avenue, N. Y. City; Charles H. Bissell, Southington, Ct.; Dr. Louise M. Dithridge, 42 Lorillard Place, Bronx; Prof. W. A. Kellerman, Ohio State University, Columbus, Ohio; Adolph Koenig, Edgewood Park, Pa.; Arthur N. Leeds, 3221 N. 17th Street, Philadelphia, Pa.; J. Schneck, Mt. Carmel, Ill.; Prof. H. M. Stephens, Dickinson College, Carlisle, Pa.; Dr. Edmund Bronk Southwick, Central Park, N. Y. City.

The secretary cast the ballot of the Club, electing these persons to membership.

The scientific program was an illustrated lecture by Dr. Grace E. Cooley on "Forestry."

The lecture considered the relation of forests and forest products to man, and the consequent importance of an intelligent comprehension of the principles and economic bearings of forestry. The nature of various important species of trees was treated of from the standpoint of silviculture, treating the tree as an individual plant; forestry, considering tree groups, or forests; physiography, discussing the relation of trees to the landscape and physiographic processes, and also from the point of view of economics and aesthetics. The historical development of the U. S. Bureau of Forestry was briefly traced from the early beginning, when a few interested persons met regularly at the home of Mr. Gifford Pinchot for discussion and instruction, up to the present organization of the national forest service. Forestry in other countries was also alluded to, and its long recognition and advanced stage of perfection abroad standing in contrast to its rather tardy development in the United States.

The meeting adjourned at 9:30 o'clock.

C. Stuart Gager,
Secretary.

May 23, 1906

On May 23, 1906, the Club held a special meeting in commemoration of the tenth anniversary of the commencement of work in the development of the New York Botanical Garden.

The meeting was held in the lecture hall of the Museum Building at the Botanical Garden. President Rusby presided, and there was an attendance of 125. The following persons were elected to membership; Percy L. Ricker, U. S. Department of Agriculture, Washington, D. C.; Miss Winifred J. Robinson, Vassar College, Poughkeepsie, N. Y.; Miss Bina Seymour, 115 West 84th Street, N. Y. City.

After the election of new members the Club listened to an illustrated lecture by its President entitled, "A Historical Sketch of the Development of Botany in New York City."

Dr. Rusby's address is published in full in the June and July numbers of Torreya.

The lecture was followed by an informal reception in the library, and by an inspection of the library, laboratories, herbaria and the museum exhibits.

C. Stuart Gager,
Secretary.

NEWS ITEMS

Dr. Herbert Maule Richards has been promoted to the professorship of botany in Barnard College, Columbia University.

Dr. W. W. Rowlee, assistant professor of botany in Cornell University since 1893, has been advanced to the rank of professor.

Conway MacMillan has resigned the professorship of botany in the University of Minnesota in order to engage in business enterprises.

We learn from *Science* that Dr. George Macloskie, professor of biology in Princeton University since 1875, has been appointed professor emeritus.

Dr. Duncan S. Johnson, associate professor of botany in Johns Hopkins University since 1901, has been advanced to the professorship of botany in that institution.

Lucien M. Underwood, Torrey professor of botany in Columbia University, received the degree of doctor of laws from Syracuse University at the last annual commencement, June 13.

In the Ohio State University, Mr. Robert F. Griggs has recently been promoted to an assistant professorship of botany, and Miss Freda Detmers to an instructorship in the same subject.

Dr. C. F. Millspaugh, curator of the botanical department of the Field Museum of Natural History, Chicago, returned in the latter part of June from a three months' visit to Europe.

Miss Helen Letitia Palliser (A.B., Columbia, 1905), who has been pursuing graduate studies in Columbia University during the past year, has accepted an appointment as assistant in biology in Vassar College.

Dr. T. C. Frye, professor of botany in the University of Washington, at Seattle, is spending a month at the New York Botani-

cal Garden, engaged in studying his collections of Pacific Coast mosses.

Mr. Howard S. Reed, instructor in botany in the University of Missouri since 1903, has resigned that position to accept an appointment in the Bureau of Soils of the U. S. Department of Agriculture.

Dr. George H. Shull, of the department of experimental evolution of the Carnegie Institution of Washington, has recently been in Santa Rosa, California, making a study of Mr. Luther Burbank's experiments in plant breeding.

Dr. Forrest Shreve, recently appointed associate professor of botany in the Woman's College, Baltimore, returned June 11 from a residence of eight months at the tropical laboratory of the New York Botanical Garden at Cinchona, Jamaica.

Dr. Cyrus G. Pringle, keeper of the herbarium of the University of Vermont, returned in June from his twenty-fifth annual collecting trip to Mexico, but left Burlington on July 5 for another Mexican expedition. He was given the honorary degree of doctor of science at the last commencement of the University of Vermont.

The *Botanical Gazette* for June states that Dr. Bradley Moore Davis, assistant professor of botany in the University of Chicago, has been spending the spring in Cambridge, completing a textbook of botany in co-authorship with Mr. Joseph Y. Bergen; also that his connection with the University of Chicago ended on July 1.

The German Botanical Society offers a prize of one thousand marks for the best essay on the correctness of the doctrine of the polymorphism of the algae. Manuscripts submitted in competition must be written in German, English, French, or Italian, and must be in the hands of the secretary of the Society, Prof. Dr. Carl Müller, Steglitz bei Berlin, Zimmerstrasse 15, by December 31, 1907.

Vol. 6 No. 8

TORREYA

August, 1906

THE RATE OF GROWTH OF PANAEOLUS RETIRUGIS *

By Gertrude E. Douglas

During the last of March, 1906, mycelium of *Panaeolus retirugis*, scattered throughout the pots in the palmhouse of the conservatory in connection with the Department of Botany of Cornell University, began to put forth fruiting bodies in great numbers. As the rate of growth of mushrooms is a matter of some interest, individuals of this species were selected in as early stages as possible and measured twice a day until they had reached maturity. These measurements were taken in the morning and evening at the same time every day, the day interval between them being of eight hours and the night of sixteen. A large number of individuals were measured during the period from March 22 to April 4, but complete records were obtained from only eighteen, owing to the sensitiveness of the mushrooms. A few of them fell over under their own weight, while others were injured by some disturbance of the soil around them. Although great care was taken in using the dividers, some plants, especially in their early stages, were injured by accidentally touching them with the instruments.

The first appearance of the mushrooms above the surface of the soil was a small dark-brown button, from 2 to 3 mm. high and 2 mm. wide. This developed rapidly. The stem grew very fast at first and pushed the pileus up into the air. The pileus at the same time grew rather slowly but steadily, enlarging at about the same rate in all dimensions, the length remaining slightly greater than the width. Just before the stem had ceased its

* Contribution No. 113 from the Department of Botany of Cornell University.

[No. 7, Vol. 6, of Torreya, comprising pages 133-156, was issued July 25, 1906.]

period of most rapid growth, the pileus began to increase rapidly in width, gaining at the same time only a little in length. The

FIG. 1. *Panaeolus retirugis* Fr. A group of plants from a lawn along a street. The young plants at the left show the veil, which breaks into V-shaped loops and clings to margin of the cap. [From Atkinson's Mushrooms, edible, poisonous, etc.]

growth in width sometimes continued one or two days after the stem had ceased to grow. In the early stages, there was a stout

veil, extending from the margin of the pileus to the stem. As the plant developed, this became free from the stem and clung to the margin of the pileus. When the plant had reached maturity, traces of the veil could still be seen in small V-shaped projections clinging to the pileus, as shown in figures 45, 47 and 48 of Atkinson's "Mushrooms, edible, poisonous, etc.," 1903. (FIGURE 1.)

The width of the stem remained nearly the same throughout the growth of the plant. It was slender upon first appearing but it soon increased in diameter, and when the plant was from 10 to 20 mm. high, was as large as at maturity. The color of the plant was dark-brown, until the pileus began to expand laterally, when it became grayish and spotted with brown or black patches. It matured in from 80 to 120 hours after appearing above the ground.

Some of the mushrooms became much larger than others, being at maturity 160 mm. in height, with a pileus of 40 mm. or more in diameter. The majority of the specimens, however, ranged from 120 mm. to 150 mm. in height, with a pileus 30–40 mm. in diameter. Those which became the largest came up nearest the base of the palm or fern trees, due probably to the greater amount of moisture here than towards the edges of the pots. The rate of growth of the eighteen plants, whose records were very nearly complete, has been worked out in curves shown in FIGURES 2 and 3.

As No. A was a very typical specimen, and as the most complete record was obtained of this, I shall describe its growth in some detail. The first measurements were taken in the morning. During the first 8-hour period by day, the plant did not change. However, during the following night, it began to grow slowly until it was 10 mm. high. On the following day, the stem entered on a period of very active growth which lasted about fifty-six hours, until the plant was 145 mm. high. During this period of active growth, the rate at first increased and then decreased slightly. The stem continued growing slowly for sixteen hours after this rapid growth interval.

The pileus began to grow slowly at the same time as the stem. It increased steadily but slowly for sixty-four hours, the width

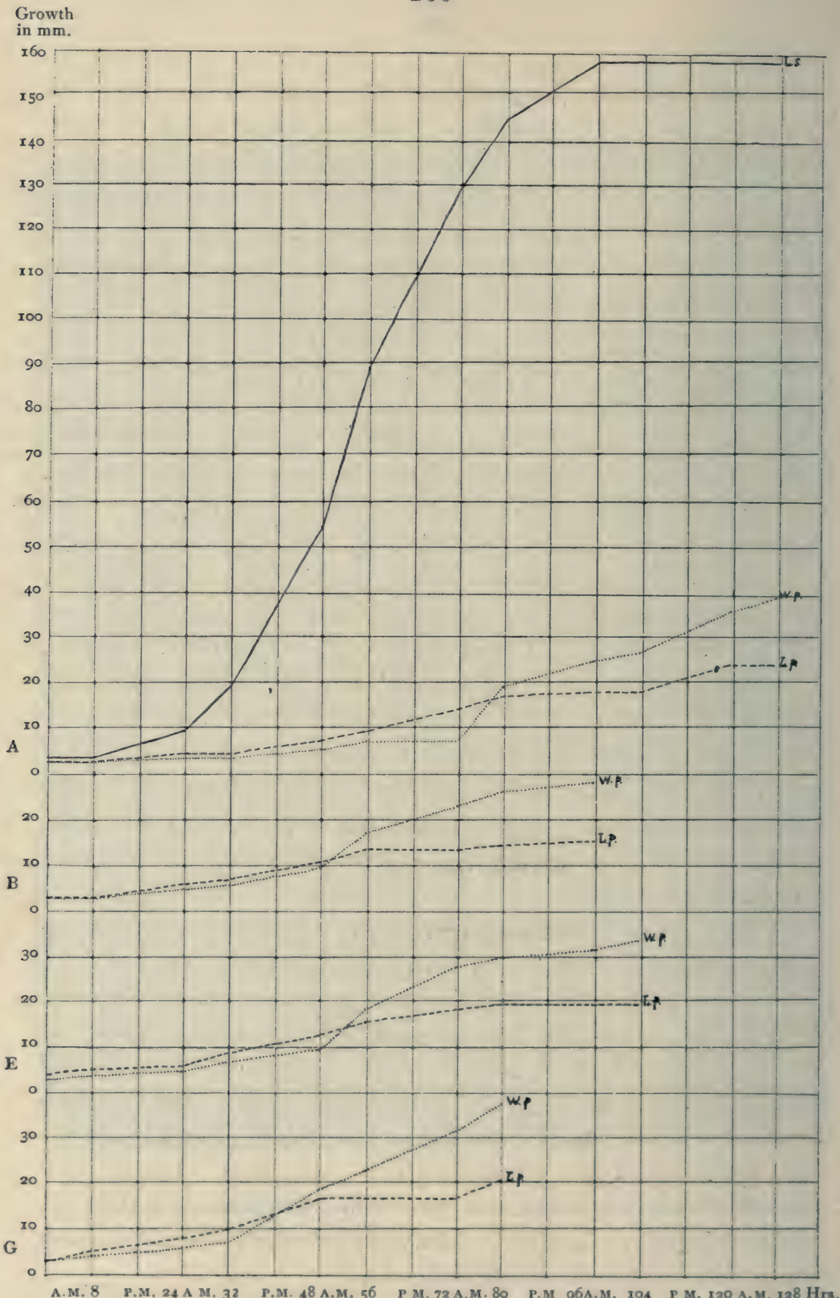


FIG. 2. *Panaeolus retirugis.* Plant A. Curves of a typical specimen showing rate of growth in length of stem and length and width of pileus.

Plants B, E and G. Curves showing rate of growth in length and width of pileus of three other specimens

remaining slightly less than the length. During the last day of the most active stem growth, the width of the pileus made a rapid increase, from 8 to 20 mm. and continued broadening for 32 hours, after the stem had ceased to grow, until it reached 40 mm. At the same time the length continued increasing slowly till it reached 25 mm.

The plant was growing six days and five nights, after its first appearance above the soil. The growth appeared to be no more rapid by night than by day. This was true also of the other specimens measured. In plant A the greatest growth which took place in any one period was during the third day. In the other plants, it occurred sometimes by day and sometimes by night.

The growth of the other specimens was very similar to this one, which has just been described. Of the records of other young plants, although their measurements were not started as early as in A, several (B, D, F, G, H, I) show an interval of slow growth at first. In records from other plants, which were not completed, because of some injury to the plant, this was also the case. After this short period of slow growth, the stem curves show a period of very rapid growth, lasting from forty to fifty-six hours. In some of the plants (P, B, H, T) the rate was nearly constant throughout the interval. In others (A, E, G, F, I, H) the rate increased up to a certain time and then decreased somewhat. In a few mushrooms (C, O, T) the curves are quite irregular, showing abrupt changes in succeeding intervals.

This period of very rapid growth was followed by another interval of slow growth, lasting about twenty-four hours, after which growth ceased. In E, F, G and B the rate was slow and steady for twenty-four hours. In the remaining plants, the curves are irregular showing slow growth at first, followed by a rapid increase in rate. Plant N gained only 1 mm. during twenty-four hours and 9 mm. during the next eight hours. Growth usually ceased abruptly after this period although in a few cases it continued to increase slightly while the pileus was developing.

The pileus of all the specimens developed very much as in plant A. In FIGURE 2, curves of three other plants are given,

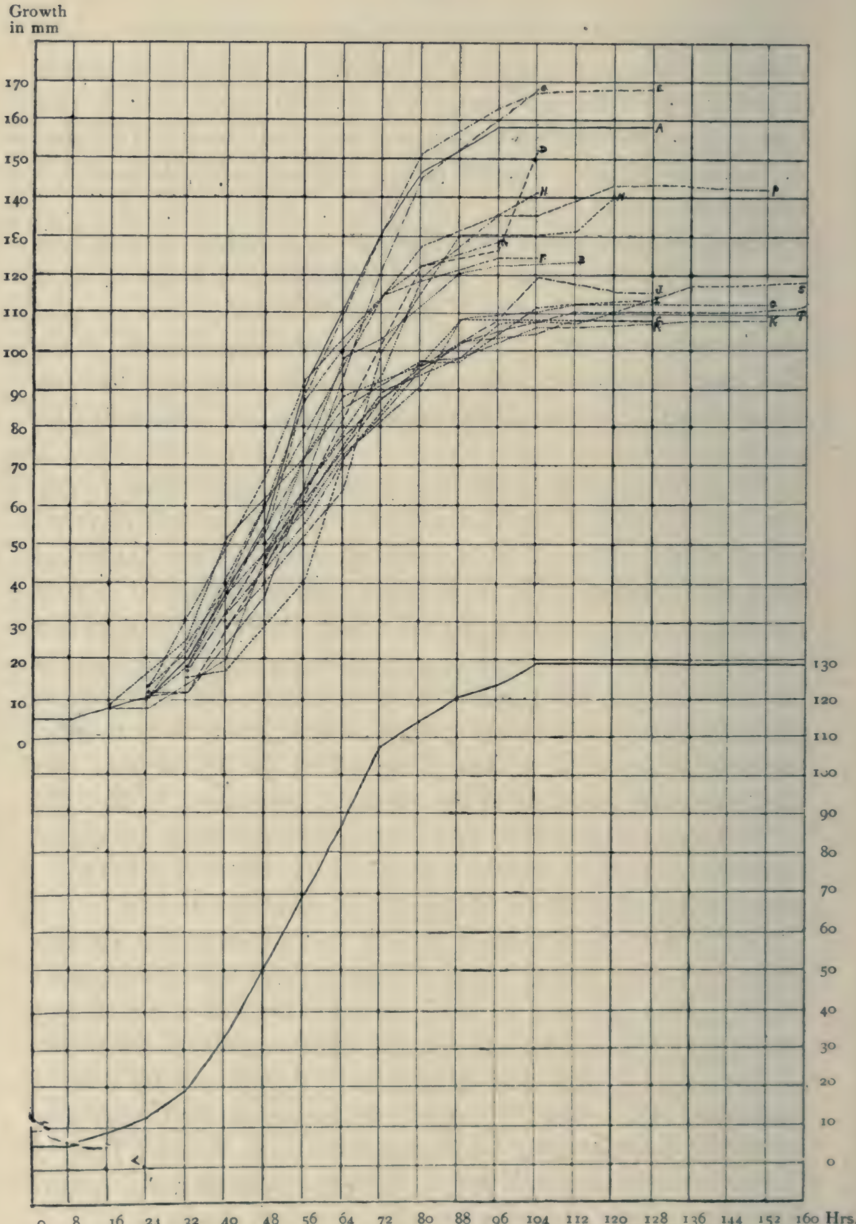


FIG. 3. Curves showing rate of growth in stem of eighteen plants of *Panaeolus retirugis.* Resultant curve beneath.

which are typical of them all. It began its growth with the stem and enlarged gradually, the width curve closely following just beneath the length curve. Suddenly the width curve crosses above the length curve. This usually takes place in the last interval before the stem ceases its most active period of growth. In four cases it did this sooner. The length curve still continues at about the same rate while the width curve keeps on at its increased rate. In some cases the rate is nearly constant, but in others somewhat variable.

The pileus often continued growing after the stem had ceased to elongate; and even when it had begun to dry and decrease in length (J, P). In O it enlarged for as many as forty hours after the stem had stopped its growth.

The width of the stem was at first about 2–3 mm. It soon increased to 3 or 4 mm. when it began to elongate. It remained of the same width until the plant was mature. Before maturity was reached, the stem in some cases decreased about 1 mm. in diameter, due to the drying of the cells in the parts which had ceased to grow.

A few plants were marked to determine in what region of the stem the greatest growth took place. A section of the pileus was cut off in each case so that the whole stem, from the ground to the point where it joined the pileus, might be taken into account. The marks were placed 2 mm. apart. The marked mushrooms were very sensitive to injury and for this reason I was not able to get records more than three times from each plant. The records show that the greatest increase in length took place near the top of the stem (see FIGURE 4). It was usually not in the topmost interval, but in one or two down from the top, near the margin of the pileus. The plants grew for several intervals down the stem, but no growth took place in the lowest ones.

These results in regard to the position of growth in the stem are similar to those obtained by J. Schmitz * in 1841, from the Hymenomycetes. He divided the stem into thirds and found the

* J. Schmitz. "Mycologische Beobachtungen als Beiträge zur Lebens- und Entwickelungsgeschichte einiger Schwämme aus der Klasse der Gastromyceten und Hymenomyceten." Linnaea **16**: 141–215. 1842.

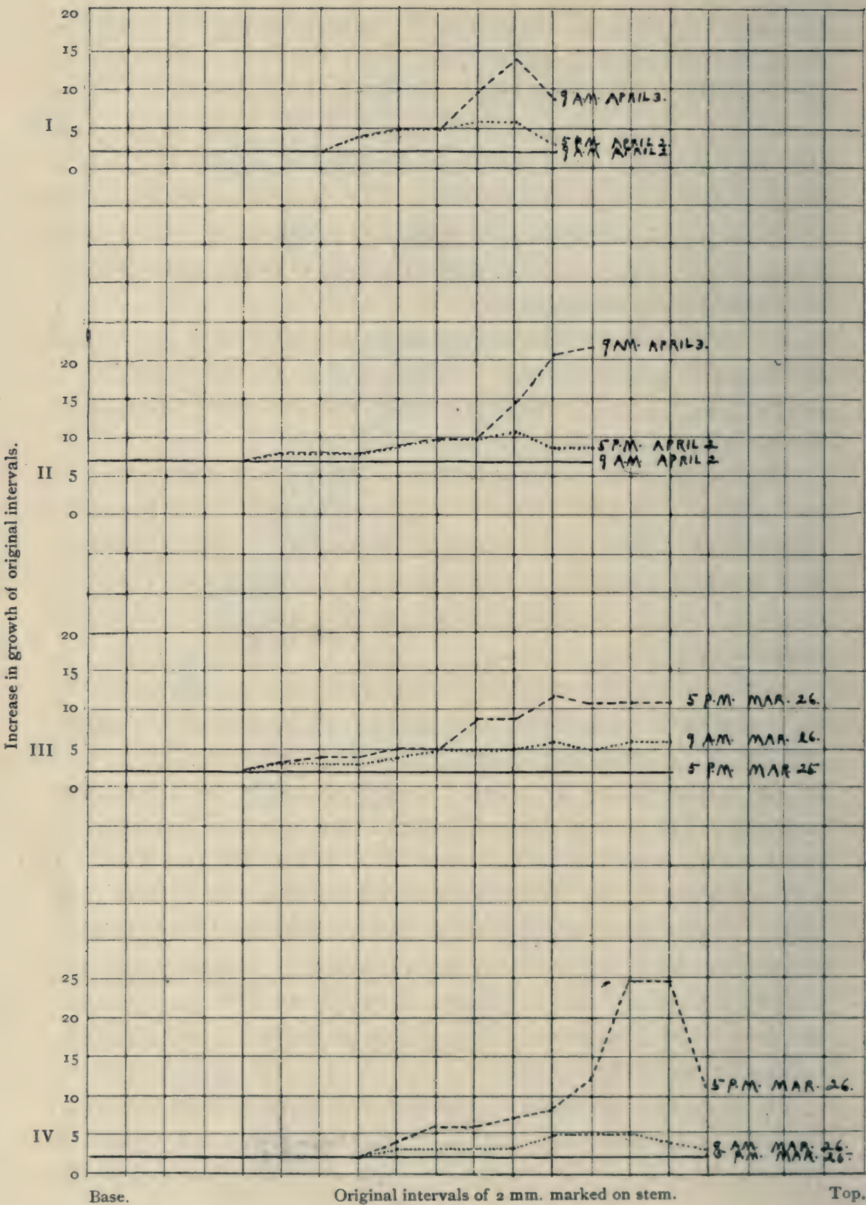


FIG. 4. Curves showing rapidity of growth in different parts of stem of *Panaeolus retirugis*.

greatest growth to take place in the topmost third, less growth in the middle third, and very slight or no growth in the bottom third. In some plants he divided his topmost interval into two parts and found that in many cases the topmost half grew less than the one beneath, although there were a great many variations from this.

In conclusion, the typical *Panaeolus retirugis*, grown under green-house conditions, requires from 4 to 5 days for the complete development of the fruit body after appearing above the ground. The stem grows slowly at first, then very rapidly for from 40 to 56 hours, then for about twenty-four hours slowly again until it ceases.

The pileus grows slowly but steadily at first and enters on its most active period of growth just before this ceases in the stem. The width remains slightly less than the length until this time. It now broadens more rapidly and continues increasing at this rate while the length increases only slowly. The pileus in many cases continues its expansion after the stem growth has been completed.

Growth is no more rapid by night than by day. The growth region of the stem lies near the top, the greatest growth taking place a few mm. below the top of the stem.

This work was undertaken at Cornell University, under the direction of Professor G. F. Atkinson, to whom I am indebted for many helpful suggestions and for the use of photographs of the developing *Panaeolus retirugis*.

Ithaca, New York,
July 7, 1906.

BOSSEKIA OR RUBACER

By P. A. Rydberg

Dr. Greene * has replaced my generic name *Rubacer* by *Bossekia* Necker.† I wish to make a protest, not so much against the replacement of the name as against the spirit and manner in which

* Leaflets 1 : 210. Ap 1906.

† Elem. Bot. 2 : 91. 1790.

it was apparently done. Dr. Greene credits himself with having relieved the genus "of a name so cheap and ill-made as *Rubacer*." As another botanist has placed that name among the hybrid words,* I shall try to meet both accusations at once.

The word *Rubacer* is composed of two good Latin words, *Rubus*, raspberry and *Acer*, maple ; hence it is no hybrid of two languages. In making compound words, the most common usage in the Latin language was to take the stem of the first word (in this case *Rub-*), and to insert the connecting vowel *-i-*, between the two components, if the second part began with a consonant. If it began with a vowel, the *-i-* was omitted. Hence *Rub-acer* is formed according to Latin usage. Perhaps it might have been better to reverse the order and to call the genus *Acer-i-rubus ;* but as this is very awkward to pronounce, *Rub-acer* was preferred. The reason why *Acerirubus* might have been better, is that in Latin as in modern languages the modifying word was usually placed first in compounding words ; but this was not always the case. If I prefer to call the old *Rubus odoratus* L. a raspberry-maple instead of a maple-raspberry, I am well within my rights. Dr. Greene's claim that I have named it "Red Maple" can not be taken seriously, for in Latin red maple would always be *Acer rubrum*, and Dr. Greene knows just as well as I, that if a compound word should be formed, in which the first component should be *ruber*, red, it would be very bad orthography to leave out the *-r*. If I had intended to make a name meaning red-maple (observe, not red maple), it would have been *Rubracer* instead of *Rubacer*.

No, with Dr. Greene the "ill-making" was not so much this, as the fact that he dislikes compound names formed by combining two generic names, as he shows in a preceding article.† To him *Cytisogenista*, *Lilionarcissus*, *Malvalcea*, *Sidalcea*, *Conioselinum*, *Ammoselinum*, etc., are "ill-made" and "cheap." Yet, Dr. Greene has made at least one such name, *Schoenocrambe*.‡ Perhaps he had some other reason for making that name ; but

*T. Holm, Ont. Nat. Sci. Bull. **1** : 36. 1905.

† Leaflets **1** : 202.

‡ Pittonia **3** : 124. 1896.

the mere fact that there existed two genera *Schoenus* and *Crambe* places the name in the same category.

If I should use the same kind of sarcasm as Dr. Greene used when he claimed that *Rubacer* meant red maple, I would claim that his genus *Madronella** was a diminutive of the Italian "madrona," and hence meant "a little matron"; but it is "cheaper" than that. Euphonious as it is, it is formed by "pieing" the letters of the first part of *Monardella*. Notwithstanding Dr. Gray's remark, that "a neat anagram is not bad," surely there is no easier ("cheaper") way of forming new generic names than making *Abdra* (is this even neat?) from *Draba*, *Sibara* from *Arabis*, *Celome* from *Cleome*. They are wholly meaningless, and a child playing with blocks may succeed just as well. They are at least as "cheap" and "ill-made" as *Rubacer*. But one should not dispute about tastes.

Now as to the validity of the name *Bossekia* Necker, for the genus *Rubacer* Rydb. There is nothing in Necker's diagnosis that points directly to *Rubus odoratus* L. It is only by inference that anyone can come to the conclusion that that species is intended, and it is only from the fourth and the last lines of the diagnosis that any clue can be had. These read respectively:

"*Folia simplicia*. Caulescentes proles."

"*Folia simplicia*. Quid. Rub. Linn."

Supposing that Necker had the first edition of Linnaeus' Species Plantarum, there are in it but two species of *Rubus* with simple leaves, *Rubus odoratus* and *Rubus Chamaemorus*. Dr. Greene indicates that the latter may safely be excluded, for he states concerning Necker: "He also defined it [*i. e., Dalibarda*] as that it might include the still older genus *Chamaemorus*." When Dr. Greene made this statement, he had apparently not studied Necker's diagnosis of *Dalibarda* as closely as he ought. It would be too presumptuous to claim that he intentionally or carelessly misrepresented the facts. There are three points in this diagnosis, with which *R. Chamaemorus* essentially disagrees. These are:

"*Semina*, 5, nuda. Scaposae proles."

* Leaflets 1: 168.

"*Fructific.* monoica."

"*Styli*, 5."

Rubus Chamaemorus L. is not scapose or scapiferous, as *Dalibarda* is; the herbaceous flowering stem has often three or four leaves. Someone may claim that Necker's idea of *scaposus* differed from the accepted one of the present day; but this claim does not hold in this case, for Necker characterized *Rubus* as "*Folia composita*, caulescentes proles." He evidently included in it two well-known European species with herbaceous stems and compound leaves, which were described in the first edition of the Species Plantarum, *viz.*, *Rubus saxatilis* and *R. arcticus.* Of these the latter at least is one-flowered and of the same habit as *R. Chamaemorus.*

Rubus Chamaemorus is never monoecious, but dioecious by the abortion of either the gynoecium or the androecium; while *Dalibarda* is monoecious as Necker described it. For emphasis, he also added after the description:

"Obs. *Mares & feminae, in iisdem individuis.*"

Necker gave for *Dalibarda:* "*Styli*, 5," "*Semina*, 5, *nuda.*" In *Dalibarda* the pistils are usually five and hence the drupelets five. The latter are rather dry and perhaps that is the reason why he gave the character: "*Semina*, 5, *nuda*"; while in the corresponding places in the diagnoses of *Rubus* and *Bossekia*, he gave: "*Bacca, minoribus formata*" (berry formed by smaller ones) and "*Bacca, minoribus* 1*-spermis, constans.*" *Rubus Chamaemorus* has many pistils and many drupelets forming a large so-called berry. Necker could never have intended to include it in his diagnosis of *Dalibarda.*

The preceding discussion has been founded upon the supposition that Necker referred to the first edition of Linnaeus' Species Plantarum, in his diagnoses of *Rubus*, *Dalibarda* and *Bossekia.* This, however, can not have been the case; for under *Dalibarda* also, he gave:

"*Folia simplicia.* Quid. Rub. Linn."

In the first edition of Species Plantarum, Linnaeus recognized *Dalibarda* as a valid genus, distinct from *Rubus.* In the second, he reduced *Dalibarda* and changes *D. repens* L. to *Rubus Dali-*

barda L. Necker must, therefore, refer to this edition or the third, which is practically identical, or else to some edition of the Systema, perhaps the 12th or the 13th. In either case the problem becomes much more complicated, because in all of these there are not less than four species of *Rubus* with simple leaves. In the second edition of Species Plantarum, *Rubus moluccanus* (which is not a *Rubacer*) is the first mentioned of these. Should not this according to Dr. Greene's own interpretation * be the type of *Bossekia?* The zoölogists often take as the type the European species best known at the time. In this case it would be *R. Chamaemorus*, which was certainly intended by Necker as a part, at least, of his *Bossekia*. As far as the facts now are known, no rule, as far as I can see, will make *Rubus odoratus* the type.

According to the "American Code," *Bossekia* is not properly published, for no type is specified, nor is it identifiable with any definite published species. President Jordan probably expressed the opinion of the majority of the American zoölogists, when he made the following statement: "A generic name should have no standing if resting on definition alone, nor until associated with some definite species." The majority of the botanists of this country evidently hold the same opinion.

Under the circumstances, I can not accept *Bossekia* in place of *Rubacer*, until Dr. Greene or someone else proves definitely that *Rubus odoratus* was the actual type of Necker's genus *Bossekia*.

New York Botanical Garden,
June, 1906.

TEREBINTHUS MACDOUGALI, A NEW SHRUB FROM LOWER CALIFORNIA†

By J. N. Rose

The name *Bursera* L. (1762) is not only a homonyn of *Bursera* Loef. (1758), but is a true synonym of both *Elaphrium* Jacq. (1760) and of *Terebinthus* P. Browne (1756). The latter as the earliest published name is here taken up.

* See Pittonia 4: 104. Ja 1900.

† Published by permission of the Secretary of the Smithsonian Institution.

Terebinthus Macdougali Rose sp. nov.

A shrub or small tree : bark of one- and two-years old branches reddish, smooth : leaves clustered at the ends of short spurs, either simple or with 3 to 5 leaflets ; rachis of compound leaves winged ; petioles short ; blade oblong, obtuse, 1 to 1.5 cm. long, crenately toothed, with very short dense pubescence on both surfaces : male flowers borne in short racemes or panicles ; sepals and petals densely pubescent ; female flowers solitary ; peduncles very short, 4 mm. long, glabrous. [FIG. 5.]

A species common on the hills near the head of the Gulf of California, first collected by Dr. E. Palmer in 1870 and recently

FIG. 5. *Terebinthus Macdougali* Rose. A photograph taken at San Felipe Bay, Lower California, February, 1904.

collected in the same region by Dr. D. T. MacDougal, after whom I take great pleasure in naming it.

It has heretofore been confused with *B. Hindsiana* of southern Lower California, from which, however, it seems quite distinct. It differs in its more vigorous branches, reddish instead of blackish bark on one- and two-years old shoots, somewhat thicker leaves and leaflets, shorter and denser pubescence on leaves, more pubescent petals, etc.

Specimens examined :

Lower California : Exact locality not given but doubtless near the mouth of the Colorado River, Dr. E. Palmer (type) ; San Felipe Bay, Dr. D. T. MacDougal, February, 1904 and E. A. Goldman, June 20, 1905 (*no. 1164*) ; Los Angeles Bay, Dr. Palmer, 1887 (*no. 572*).

Sonora : Hills near the Gulf of California, C. G. Pringle, August 20, 1884.

The type specimen is preserved in the U. S. National Herbarium.

U. S. National Museum.

NOTES ON SOUTHERN VIOLETS — I

By Homer Doliver House

The fact that a mere superficial resemblance between two species in the field can be accentuated in dried specimens to an extent which has prevented their separation cannot be better illustrated than in the case of the following new species remarkably distinct from *Viola pedata* in the field, but losing its characteristics to a large extent when pressed and dried.

Viola redunca sp. nov.

Related to *V. pedata* and *V. ampliata*. Plants solitary, rarely clustered : rootstock short, 6–15 mm. thick : earliest leaves short-petioled, reniform-ovate in outline, lobed or divided into 3–5 blunt, wedge-shaped segments, later leaves with petioles 6–15 cm. long, blades dark-green above, paler beneath, divided into 5–9 linear-lanceolate, acute segments, these usually with one or two teeth near the ends, the outermost segments of the mature blades spreading nearly at right angles to the petiole, margins minutely ciliate : sepals linear-lanceolate, acute or acuminate, strongly truncate at the base, 13–15 mm. long, the lateral ones 3 mm. broad or more : corolla 3–4.5 cm. broad, lavender-blue, the lateral pair of petals slightly smaller than the others, the upper pair turned back to back ; spur of the lower petal 5 mm. long or more, curved strongly upward and projecting between the two upper petals, tinged with purple, flattened laterally but rounded in outline at the end : capsules 8–9 mm. long ; seeds pale-brown

Type collected by the writer at Clemson College, Oconee Co., South Carolina, March 22, 1906 (*no. 1720*).

Apparently the commonest violet of the southern Piedmont region, and observed in great abundance throughout western South Carolina and adjacent Georgia, extending to an altitude of nearly 5,000 feet in northeastern Georgia.

Viola redunca is distinguished from *V. ampliata* Greene by its smaller size, the spur curved straight upward at the end and laterally flattened and the upper pair of petals turned back to back; from *V. pedata* L. (concolorous form) by its remarkable spur and peculiar color of the corolla. My attention was first drawn to the species by the uniform difference in the color of the corolla from that of *Viola pedata* which I have seen about the city of Washington.

Viola glaberrima (Ging.)

V. hastata var. *glaberrima* Ging. in DC. Prodr. **1**: 300. 1824.

V. tripartita glaberrima Harper, Bull. Torrey Club **27**: 337. 1900.

Type locality: "In sylvis et collibus Carolinae septentrionalis."

Viola tripartita frequently has entire leaves which gives the plant the appearance of *V. glaberrima* and especially is this true in dried specimens.

V. glaberrima has broader leaves than any entire-leaved forms of *V. tripartita*, and they are less pubescent, deeper and more glossy green, usually glabrous, with stronger, more regularly toothed margins.

In my observations during the past spring and early summer upon many hundreds of individuals, I have not yet found the two species growing intermingled or showing any intermediate forms and it seems that *Viola glaberrima* has as much right to specific recognition as has *V. scabriuscula* of the north.

Viola Walteri nom. nov.

V. canina Walt. Fl. Car. 219. 1788. Not L.

V. Muhlenbergii var. *multicaulis* T. & G. Fl. N. Am. **1**: 140. 1838. "Rocks near Kentucky River, *Short!*"

V. canina var. *multicaulis* A. Gray, Bot. Gaz. **11** : 292. 1886.
V. multicaulis Britton, Mem. Torrey Club **5** : 227. 1894.
Not *V. multicaulis* Jord. Pugill. Pl. Nouv. 15. 1852.

Michaux, describing *Viola debilis* (Fl. Bor.-Am. **2** : 150. 1803), questionably assigns Walter's *V. canina* to his species, but *V. debilis* is described as having " floribus albis ; longe pedunculatis," and is generally referred to *V. striata* Ait., while Walter's *V. canina* is quite certainly the species under consideration.

Some extensions of range

Viola rotundifolia Michx. (to the mountains of North Carolina and Tennessee, *fide* Small). Very abundant at Tomassee Knob, Mountain Rest and Russells, Oconee Co., South Carolina, and on densely wooded slopes about Rabun Bald in Rabun Co., Georgia.

Viola canadensis L. (to North Carolina, *fide* Small). Occasionally found on damp shady ravine-sides and slopes looking northward about Rabun Bald in northeastern Georgia, and abundant on the north side of Tomassee Knob, Oconee Co., South Carolina.

Clemson College, S. C.

REVIEWS

Knuth's Handbook of Flower Pollination*

Hermann Müller's, " The Fertilization of Flowers," upon which the present encyclopedic work is based, was published thirty-three years ago, and its English translation, by Thompson, ten years later. That book has been out of print for several years, and subsequent investigations have made desirable, not a new edition of the older publication, but an entirely new work. This was undertaken by Dr. Knuth, whose extensive researches in the subject for over fourteen years peculiarly fitted him for the task.

The work is dedicated to Christian Konrad Sprengel and Dr.

* Knuth, Dr. Paul. Handbook of Flower Pollination, based upon Hermann Müller's work, " The Fertilization of Flowers by Insects." Translated by J. R. Ainsworth Davis. Vol. I, pp. xix + 382, *f. 1–81.* Oxford : At the Clarendon Press. 1906.

Hermann Müller, the two greatest masters of the science of flower pollination. The present volume contains, as a frontispiece, a likeness of Kölreuter, the pioneer in observations on the pollination of flowers.

Three volumes are planned, as follows: Vol. I. Introduction and literature; Vol. II. The observations in flower pollination hitherto made in Europe and in the Arctic regions; Vol. III. Observations in flower pollination made outside of Europe. It is announced that volume II is now in press. This "Handbook" is of uniform binding with Pfeffer's Physiology of Plants and Goebel's "Organography."

Volume I gives a short historical review of the subject, from Kölreuter to the present. This occupies 211 of the 382 pages. The treatment here is general, and deals with the structure of flowers and insects in relation to pollination. The remainder of the book is an exhaustive bibliography down to January 1, 1906. Here the names of American authors occupy a conspicuous place.

There is a "Preparatory Note to the English Edition" by I[saac] B[ayley] B[alfour]. The work is the first one of importance on the subject in which the modern distinction between the terms pollination and fertilization is recognized. Unlike the numerous "popular" presentations of the subject, the illustrations are none of them colored, but do, however, possess the merit of really illustrating the text. There is no index, and while one would have been very desirable, the character of the text makes the loss felt less than is the case in most books, and its need is fairly well supplied by a rather full table of contents.

In any recent writings on pollination one naturally looks for either confirmation or refutation of Plateau's iconoclastic contributions, which challenged the virtually universally accepted theory of the ecological rôle of color in flowers. A "Supplement to the Introduction" contains, besides a biographical note on Kölreuter, a critical examination of Plateau's observations and theories. Their importance is minimized by Knuth, who disagrees with Plateau fundamentally, and closes his critique with the statement of the following law:

"Attraction from considerable distances is certainly effected for the most part by the odour of the flowers, which fills the air as with invisible clouds, and indicates the direction for flight; when the insects approach nearer (1–2 m.), the colours of flowers undertake the task of attracting them further, and when they finally settle, the lines and points long since described by Sprengel under the name of 'Saftmal' (*i. e.*, sap-mark) serve to point out the way to the nectar."

C. Stuart Gager.

FIELD MEETINGS OF THE CLUB

The fifth forestry lesson was given in Van Cortlandt Park on June 2. Twelve persons were present, with Dr. Marshall A. Howe as instructor and guide. The general subject of the lesson was "Reproduction of the Forest." Attention was directed to the extensive and often wasteful cutting of the American forests and the great economic importance of the replacement of the forests was emphasized. Natural and artificial methods of forest reproduction were discussed, as was also the rapidity of growth of such trees as the white pine, the hardy catalpa, and the black locust, which, even when grown from the seed, may yield one or more crops of marketable timber within an ordinary lifetime. The temperature of the air, the amount of moisture in the soil, and other less important conditions affecting the prevalence of certain trees were spoken of. The fact that seedlings of certain trees cannot live and thrive in the shade of their parents was mentioned as one of the chief causes of the rotation or succession of species that is sometimes observed in forests. Young beeches and maples are so tolerant of shade that they commonly succeed older individuals of the same species, and white pine often succeeds itself when the stand is not too dense.

On June 9, the sixth forestry lesson was given at the New York Botanical Garden, with Mr. H. A. Gleason as instructor and guide. The hemlock forest and other wooded portions of Bronx Park were visited. The character of the forest floor, the soil and light conditions, plant associations, and natural pruning were the special subjects for observation and discussion.

The excursion announced for June 16, to Alpine, New Jersey, with Dr. P. A. Rydberg as guide, was not made, the weather conditions being very unfavorable.

The excursion of June 23 was to Montclair Heights, N. J., under the guidance of Dr. Rusby. The weather was very threatening and but five persons attended. The storm broke almost immediately after the party left the train, but not until after a number of interesting plants had been collected. *Leucothoë* was found in a wet pocket in the trap rock, but was past flowering. The development of plants of *Geranium carolinianum* L., growing under different conditions of soil and exposure, was found very interesting. Careful observations were made of the fruiting stage of *Viola alsophila* Greene. The plant formed a dense growth, to the exclusion of all else, in large patches on wet ground, reaching a height of eight to ten inches. Its habit at this time is very erect, and a striking peculiarity is the perfectly horizontal position of the leaf blades. The distinguishing characteristics of these blades are the peculiar sparse hairiness of the upper surface and the satiny sheen of the glabrous lower surface. The cleistogamous fruits were scarcely full-grown, and their position and form and the curvature of the peduncles showed much variation, but they were for the most part sharply recurved, or almost reflexed, which is probably the typical mature condition. This plant is probably the real *V. blanda* Willd., as indicated by the original figure.

On June 30, the excursion was to West Orange, N. J., under the leadership of Mr. Percy Wilson.

The meeting of July 2 to 9, in connection with the Botanical Symposium was at Mountain Lodge, Little Moose Lake, the seventeen persons in attendance being guests of the Adirondack League Club. The flora of the region has been attentively studied for some years past by several members of that Club, especially by Mrs. Annie Morrill Smith, who has published a preliminary list of the plants. The work of the visiting botanists on this occasion will perhaps add a score or more of species to this list. The method of work was to make extended excursions during the day, and exhibit the collections and discuss the results

at evening meetings, held in a large room over the boat-house. All were heartily grateful to their hosts for the care taken for their comfort and for the success of their work. Mrs. Smith was indefatigable in arranging and providing for the party. Interest centered chiefly, perhaps, in the violets, the ferns and the edible fruits. The violets were here, as everywhere, very puzzling, and proved that we have not even yet a basis for properly understanding the genus. *Viola renifolia* Gray was the predominant species, and was observed closely. It is quite evident that it is the northern ally of *V. alsophila* Greene, the differences between the two being slight, although genuinely specific. The most conspicuous and constant is the hairy lower leaf-surfaces and petioles of *V. renifolia.* The strawberries came in for special attention, all the eastern species except the red form of *Fragaria vesca* and *F. canadensis* being collected. The white-fruited *F. vesca* was very markedly later than any other. *Fragaria Terrae-novae* Rydberg was collected on the summit of Burnt Mountain on July 3 with ripe fruit. Dr. Rydberg was present and identified the species. The plants grow in company with *F. virginiana* Duch. Other plants growing with it were *Rubus americanus* (Pers.) Britt., with fine ripe fruit, *R. hispidus* L. in full bloom, a species of *Gyrostachys* in a young state, perhaps *G. plantaginea* (Raf.) Britton, all in damp pockets in crevices of the rocky summit. In drier spots, *Polygonum cilinode* Michx. and *Achroanthes unifolia* (Michx.) Raf. were collected. On the shores of Little Moose Lake grow two very different forms of *Vaccinium canadense* Richards. One is the ordinary very pubescent form. The other has much smaller, narrower and thinner leaves and is much less hairy. The plant is very low, and its branches spread almost perfectly horizontally. This form may well prove distinct. The fruit in both was very young. Other interesting material collected for the economic museum of the New York Botanical Garden included *Ribes prostratum* L'Her., with ripe fruit, *R. lacustre* (Pers.) Poir., with immature fruit, *Amelanchier canadensis* (L.) Medic., and the rhizomes of *Calla palustris* L. The many forms of *Amelanchier*, growing together in masses on the lake shores were almost discouraging to one who would find constant specific characters.

On Saturday afternoon, July 7, representatives of the Club visited Central Park, New York City, under the guidance of Dr. Edmund B. Southwick, and examined some of the rare trees and shrubs there under cultivation.

The field meeting of July 14 was devoted especially to a study of the mosses, Mr. R. S. Williams acting as guide and instructor. Members of the party met at the Museum of the New York Botanical Garden and walked thence to Van Cortlandt Park, where various types of mosses were observed.

The excursion planned for July 21, to Little Falls, N. J., was prevented by the persistently stormy character of the day.

On July 28, members of the Club enjoyed the hospitality of Professor L. M. Underwood at Redding, Connecticut, where numerous gorges and wooded ravines offer an interesting flora. Flowering or fruiting specimens representing thirty-seven natural families of seed-plants were collected.

The field meeting of August 4 was an excursion especially for marine algae. Hunter's Island, which is on Long Island Sound within the limits of New York City, was visited, with Dr. Marshall A. Howe as guide. *Gracilaria confervoides* (L.) Grev. was among the rare and more interesting species found.

NEWS ITEMS

Dr. J. N. Rose, associate curator of the Division of Plants, U. S. National Museum, left Washington August 1, to continue his botanical explorations in Mexico.

Professor C. F. Baker, botanist of the Estación Agronómica Central de Cuba, has recently spent a month or more in the United States, returning to Cuba on August 15.

Homer D. House, associate professor of botany and bacteriology in Clemson College, was engaged during the month of July in holding farmers' institutes in various parts of South Carolina.

Dr. Augustine Henry, well known by his travels and botanical collections in China and Formosa, arrived in New York on the *Majestic*, August 3, for a tour of the United States and Canada.

Mr. Norman Taylor, of the New York Botanical Garden, sailed on August 18 for Cuba, where he will spend several weeks among the mountains near Santiago in company with Professor B. E. Fernow, of Ithaca, N. Y.

Guy West Wilson (B.S., DePauw University, 1902; A.M., 1903; M.S., Purdue University, 1906), and Ralph Curtiss Benedict (Ph.B., Syracuse University, 1906) have been appointed assistants at the New York Botanical Garden.

Professor F. S. Earle has retired from the directorship of the Estación Agronómica Central de Cuba, a post which he had held since the organization of the institution in the spring of 1904. He will remain for the present on a fruit farm owned by him near Herradura in the Province of Pinar del Rio.

William Mitten, well known as a bryologist, died at Hurstpierpoint, Sussex, England, on July 20, 1906. His name was familiar to American students of the mosses especially through his "Bryology of the Survey of the 49th Parallel of Latitude" and by his "Musci Austro-Americani," a volume of 659 pages descriptive of the mosses of South America.

Henry Allan Gleason (Ph.D., Columbia University, 1906) has been appointed instructor in botany in the University of Illinois, where he will have classes in general morphology and systematic botany and will also have charge of the herbarium. The University has recently purchased the botanical collections of F. E. MacDonald, of Peoria, Illinois, containing about 12,000 sheets of spermatophytes.

Dr. D. T. MacDougal, director of the department of botanical research of the Carnegie Institution of Washington, left New York on August 18 for the City of Mexico. He will devote about six weeks to a study of storage organs of desert plants in the Tehuacan region and to collecting Cactaceae there in company with Dr. J. N. Rose, after which he will return to the Desert Botanical Laboratory at Tucson, Arizona.

Dr. William A. Murrill, first assistant of the staff of the New York Botanical Garden, returned to New York on August 18

from a trip to Europe. Visits were made to the mycologist Bresadola in Trient and to museums and botanical gardens in Paris, Berlin, Copenhagen, Upsala, Stockholm, Leyden, Amsterdam, and Kew. From July 31 to August 2 he was in attendance upon the International Conference on Hybridization and Plant-Breeding, held in London under the auspices of the Royal Horticultural Society.

The two Walker prizes offered annually by the Boston Society of Natural History for the best memoirs on specially designated subjects connected with natural history are offered for 1907 for memoirs on six subjects, three of which are botanical, as follows: "(1) The structure and affinities of some fossil plant or group of fossil plants. (2) The development of the gametophytes in any little-known representative of the Coniferales. (3) The anatomy and development of some order or group of the angiosperms." The first prize is sixty dollars, which, at the discretion of the committee, may be increased to one hundred dollars, for a memoir of marked merit. Competition is not restricted but is open to all. The manuscript of memoirs submitted must be in the hands of the secretary on or before April 1, 1907. Further particulars may be had by addressing Glover M. Allen, Secretary, Boston Society of Natural History, Boston, Mass.

Vol. 6 No. 9

TORREYA

September, 1906

TUBER–FORMATION IN SOLANUM TUBEROSUM IN DAYLIGHT

By C. Stuart Gager

Thomas Andrew Knight, writing in 1829 to Dr. Bevan, said:* "I have been and am still engaged in some experiments on the potato, which plant has given me more physiological information than all the remainder of the vegetable world; and where it has not given me the information I wanted, it has directed me where to find it."

It is too well known to need statement here, that the potato tuber is a branch, modified as an organ for the storage of food, and resulting from the thickening of stolons that arise from the basal parts of the main axis. This homology was recognized by Knight as early as 1801, and was later demonstrated by Turpin † in 1828.

By an ingenious contrivance, Knight ‡, in 1806, succeeded in growing potato plants so that only the fibrous roots penetrated the soil. By preventing the formation of tubers on the stolons that normally would have developed underground, and also on the lateral branches of the aërial portion of the shoot, he succeeded in getting the plants to form tubers at "the extremities of the branches, those being the points most distant from the earth,

* A selection of the physiological and horticultural papers of T. A. Knight, p. 63, London, 1841.

† Turpin, J. F. Mémoire sur l'organisation intérieure et extérieure des tubercules du Solanum tuberosum et de l'Helianthus tuberosus, considérée comme une véritable tige souterraine, et sur ces tiges. Mémoires du Muséum d'Histoire Naturelle. Read Dec. 27, 1828.

‡ Knight, T. A. On the inverted action of the alburnous vessels of trees. Phil. Trans. 96: 293. 1806.

[No. 8, Vol. 6, of Torreya, comprising pages 157–180, was issued August 25, 1906.]

in which the tubers are naturally deposited." "Many of the joints of the plants during the experiment became enlarged and turgid; and I am much inclined to believe," he states, "that if I had prevented the formation of regular tubers, these joints would have acquired an organization capable of retaining life, and affording plants in the succeeding spring." So far as the writer has been able to ascertain, this records the first successful attempt to secure experimentally the formation of potato tubers in the light, and is the first record that tubers can, under any circumstances, form on the aërial portions of the shoot.

On another variety of potato, as soon as tubers began to form normally, Knight nearly detached many lateral aërial branches, leaving them connected only by enough "alburnous and cortical fibres and vessels as were sufficient to preserve life." After this treatment small tubers formed in the light at the base of the leaves of the depending branches. This experiment was one of many, performed by the same keen observer and thinker, to prove that sap may pass down in plants, and that the descending current, though normally passing through the bark, as he had previously demonstrated,* may, under certain circumstances, travel downward through the alburnum, or sap wood.

Three years later †, Knight succeeded in producing experimentally "a profusion of blossoms" from the buds of the potato tuber. By destroying the above-ground branches he also induced the under-ground stem parts to depart from their habit and grow up into the air and light. From these experiments he was led to the conclusion that the runners on which the potato tubers are formed, "are very similar in organization to the stem of the plant, and readily emit leaves and become converted into perfect stems, in a few days, if the current of ascending sap be diverted into them; and the mode in which the tuber is formed above, and beneath the soil, is precisely the same."

It is fortunate for agriculture that some of Knight's later conclusions are not wholly correct, else planting would, indeed, be

* Knight. Account of some experiments on the descent of sap in trees. Phil. Trans. 93: 277. 1803.

† Knight. On the origin and formation of roots. Phil. Trans. 99: 169. 1809.

a most laborious proccess, for in 1822 he states * that the potatoes, being "shoots, or branches, which have grown thick instead of elongating," gardeners should take pains to plant the tubers right side up with care, as they "retain the disposition of branches to propel their sap to their leading buds, or points most distant from the stems of the plants, of which they once formed parts."

In this same paper he describes another experiment, in which he planted seed tubers above the soil so that only the fibrous roots growing from them entered the ground. Then, by removing all blossoms and runners that appeared, he secured "a numerous crop of young tubers," growing sessile at the buds or "eyes" of the old.

Moretti † describes a modification of one of the experiments performed by Knight in 1806. By cutting a potato stem near its base so that the upper portion is joined to the root end only by means of a small strip, nourishment was prevented from being translocated to the tuberiferous stolons. Under this condition tubers formed in the leaf axils along the branches exposed to light.

In more recent years de Vries is said by Vöchting to have secured the formation of tubers by *Solanum tuberosum* in the light, but the original paper ‡ has not been accessible to the writer.

The most recent and most extensive experiments on tuberization are by Vöchting.§ He did not succeed in securing the formation of tubers in the light in all varieties, but in the variety "Saucisse," while the main stem never developed tubers in the light, its side branches may become transformed into tubers under such conditions. In his later experiments Vöchting ||

* Knight. An account of an improved method of raising early potatoes in the open ground. Trans. Hort. Soc. London, **4**: 447. 1822.

† DeCandolle, A. P. Pflanzen-physiologie. Stuttgart und Tübingen, 1833. DeCandolle quotes Moretti et Guieciardi, De nonnullis physiologico-botanicis animadversionibus. 1831.

‡ DeVries, H. Beiträge zur speciellen Physiologie landwirtschaftlicher Kulturpflanzen. Landwirth. Jahrb. **7**: 19, 217, 591, 659. 1878.

§ Vöchting. Ueber die Bildung der Knollen. Bibliotheca Botanica, 1^{4}. 1887; Zur Physiologie der Knollengewächse. Leipzig, 1899. Also in Jahrb. Wiss. Bot. **34**: 108. 1900; Ueber die Keimung der Kartoffelknollen. Bot. Zeit. **5**: 87. 1902.

|| *l. c.* 1902.

secured good tubers on aërial branches in the dark, but only unusually fleshy sprouts in very diffuse light.

The accompanying illustration (FIGURE 1) is from a photograph of a specimen found growing in the conservatory of the New York Botanical Garden. It is customary here, as in many green-houses, to place pieces of "potato" on the soil of the potted plants to protect the plant from snails and slugs. The potato, being more accessible, is eaten and the plant spared.

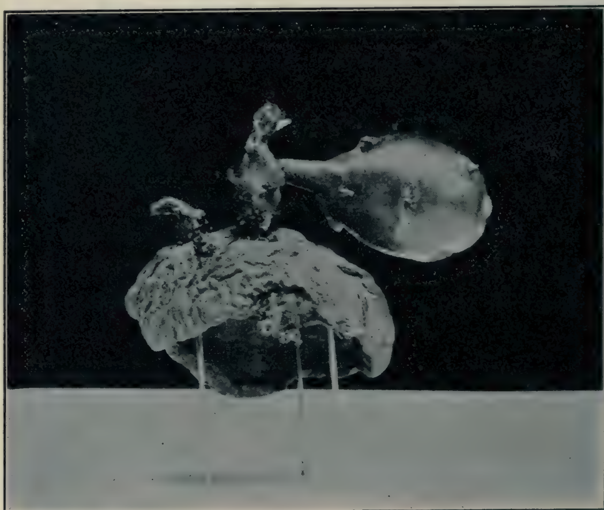


FIG. 1. *Solanum tuberosum.* Tuber-formation on aërial shoot in light.

In the humid atmosphere of the glass house these pieces of potato readily sprout, and a few weeks ago the specimen here illustrated was found, growing in sufficient light to develop abundant chlorophyll in the cortex.

The entire specimen, including the piece of the seed tuber, had been constantly above the surface of the soil, and exposed to rather strong illumination. As will be seen from the picture, the sprout that bears the new tuber sprang from an "eye" near the apical end of the seed-tuber, and is somewhat abnormally short and fleshy. A few of the leaves at the nodes of the young green tuber show a slight differentiation into petiole and blade,

and from the axil of one of these leaves a sprout, about 5 mm. long, has developed. The tuber itself is about 25 mm. long and 20 mm. wide at the thickest part.

This specimen is instructive, not only as a unique demonstration of the stem nature of the "potato," but also in connection with a recent theory that potato tubers are caused by a fungus. It is known that a species of fungus, a *Fusarium*, is endotrophic with *Solanum tuberosum*, and the question has been raised by Bernard * as to whether or not the tubers are an effect of this fungus, and dependent upon it for their formation. Jumelle † infected soil artificially with a species of *Fusarium*, and planted in the infected soil *S. Commersoni*, a species that forms only small and few tubers. A control planting was made in sterilized soil. The infection produced no constant results, however, with *Solanum Commersoni*, and contradictory results with varieties of *S. tuberosum*. In the case of the "Early Marjolin" variety, association with the fungus was accompanied with increased tuberization, while the opposite result was obtained with the "Géant de Lyon" variety.

The formation of a tuber in the air and light, therefore, is of interest as showing that tuber-formation may take place under conditions in which the *Fusarium*, in all probability, does not enter as a factor.

Of potato tubers Goebel ‡ says : "They are nothing else then than leaf-shoots which on account of their position in the whole shoot-system of the plant have become accustomed to an underground life, and subsequently under the influence of the material supplied from the aërial leafy shoots have become transformed into tubers." The phenomenon is an illustration of what Goebel calls "qualitative correlation."

It is instructive to recognize just what has taken place in the present anomaly. If we disregard the small amount of photosynthesis that may have occurred, owing to the slight develop-

* Bernard, Noël. Études sur la tubérisation. Rev. Gén. de Bot. **14** : 139, 269. 1902.

† Jumelle, Henri. De l'influence des endophytes sur la tubérisation des Solanum. Rev. Gén. de Bot. **17** : 49. 1905.

‡ Goebel, K. Organography of plants. Eng. trans. by Balfour, **1** : 215. 1900.

ment of chlorophyll in the cortex of the new tuber, the metabolic changes have been accompanied by no increase of substance. On the contrary, it is probable that, owing to respiration, the dry weight of the parts is less than that of the original piece of tuber.

Part of the food elaborated and digested in the leaves of the parent plant was translocated to the tuber of which the piece in FIGURE 1 was a part. After the portion in question was cut off and placed in the conservatory this stored food began to be redigested and translocated to the developing "eye" or bud. There has been, then, merely a transfer of substance from the cells of the old tuber to the cells which ultimately developed the new.

Normally this awakened bud would presumably have given rise to an aërial leafy branch. The causes of its development into a tuber are difficult to recognize. Environmental conditions were not such as have favored tuberization in recorded experiments, and internal causes are still more difficult to assign.

NEW YORK BOTANICAL GARDEN,
July 13, 1906.

A NEW CHESTNUT DISEASE*

BY WILLIAM A. MURRILL

A new and very serious disease of our native chestnut is epidemic in many parts of New York City and threatens to destroy practically all the chestnut trees in this vicinity. A field survey has not yet been undertaken, but the disease is known to occur also in New Jersey, Maryland, the District of Columbia and Virginia.

An investigation of the disease was begun at the New York Botanical Garden nearly a year ago, and most of the facts regarding it are now in our possession. Pure cultures of the fungus

* Murrill, W. A. A serious chestnut disease. Jour. N. Y. Bot. Garden **7** : 143–153. *f. 13–19.* June, 1906.

Merkel, H. W. A deadly fungus on the American chestnut. Ann. Rept. N. Y. Zoöl. Society **10** : 97–103. July, 1906. [Illust.]

Murrill, W. A. Further remarks on a serious chestnut disease. Jour. N. Y. Bot. Garden **7**: 203–211. *f. 25–30.* September, 1906.

were obtained from affected chestnut twigs in November and cultivated on various nutrient media until early in the spring, when inoculations were made into several young chestnut trees in the propagating houses; on all of which the disease has appeared in its normal condition during the present season and fruited abundantly. All of the twigs inoculated have died, the others remaining perfectly healthy. All attempts to introduce the fungus into a tree without an abrasion of the surface of the twig have failed.

The fungus enters through a wound or dead limb and works beneath the cortex in the layers of the inner bark and cambium. The bark soon dies and changes color and later becomes rough and warty from the presence of numerous yellowish-brown fruiting pustules, which appear in the lenticels and send out peculiar twisted spore-masses containing millions of minute summer spores. These spores are produced continuously throughout the summer and early autumn and germinate without a period of rest when they fall upon wounds in other chestnut trees.

The winter spores mature in late autumn in the same pustules and germinate the following spring, when the mycelium which has passed the winter in the infected branch also begins to grow again and continues to spread beneath the cortex, sending up fruiting pustules and distributing spores as in the previous season.

The fungus attacks twigs, branches and trunks of chestnut trees, irrespective of size or position, and usually proceeds in a circle about the affected portion until it is completely girdled. The death of the end of a branch necessarily causes loss of vitality and partial death to the remainder, and this enables the fungus to spread very rapidly through the tissues below until it reaches the main trunk, when the life of the tree is measured by a few years at best.

The mycelium of the fungus is unfortunately so active and so well protected that no treatment can be suggested except the rigorous use of the pruning knife; and this has many limitations. Spraying solutions will not avail, since they do not reach the fungus and cannot possibly kill the countless numbers of spores continually produced; nor will they protect the surface from

wounds and other openings through the bark into which spores are liable to fall and germinate.

Old trees badly affected — and there are many of this description in New York — are not worth the trouble even of pruning; the sooner they are cut and burned the better.

Large trees with only a few branches affected might be saved for several years by cutting away these branches a foot or more below the affected area and coating the cut surface with coal-tar or other suitable substance. The same treatment may be applied to vigorous young trees with much more prospect of success.

My observations in the Bronx this season have led me to take a gloomy view regarding the immediate future of the chestnut here. The disease seems destined to run its course, as epidemics usually do, and it will hardly be safe to plant young trees while the danger of infection is so great.

The fungus in question appears to be confined to our native

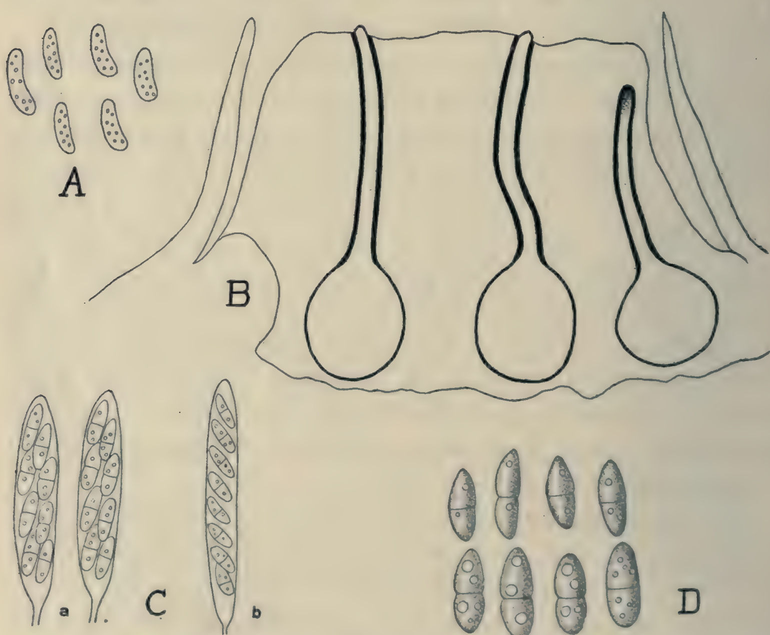


FIG. 2. *A*, Summer spores. *B*. Pustule in section showing perithecia. *C*. Asci with sporidia: *a*, usual form; *b*, form rarely found. *D*. Sporidia.

chestnut. A related species occurring on the European chestnut is quite different in character and totally different in habit. I have shown specimens to many mycologists, both in Europe and America, and they all pronounce it new to them and undescribed. It belongs to *Diaporthe*, a large genus of the pyrenomycetes, whose species are as a rule confined to dead wood and are not parasitic. The name I have chosen refers to its very destructive parasitic habit. A detailed description follows:

Diaporthe parasitica sp. nov.

Pustules numerous, erumpent, at first yellow, changing to brown at maturity: perithecia usually 10–20 in number, closely clustered, flask-shaped, deeply imbedded in the stroma in the inner bark, scarcely visible to the unaided eye; necks long, slender, curved, with thick black walls and rather prominent ostiola: asci oblong-clavate, $45–50 \times 9\ \mu$, 8-spored; sporidia usually biseriate, hyaline, oblong, rounded at the ends, often slightly constricted, uniseptate, $9–10 \times 4–5\ \mu$. Summer spores very minute, $1 \times 2–3\ \mu$, pale-yellowish, cylindrical, slightly curved, discharged in twisted threads as in *Cytospora*.

Found upon living or recently killed branches of the American chestnut, *Castanea dentata*. Type collected by W. A. Murrill in Bronx Park, N. Y. City, November 26, 1905. Known also from New York, New Jersey, Maryland, the District of Columbia and Virginia.

New York Botanical Garden.

SHORTER NOTES

A newly introduced Plant in Rhode Island.—Some eight or ten years ago, as near as I can recall, there appeared on waste-land, near our general passenger station in Providence, a few plants of *Grindelia squarrosa*, belonging, as every one knows, in the far West. There are now several acres of the plant here, and its increase is deterred only by building operations in the neighborhood. If offences must come, in the shape of weeds, it is well to have them handsome—and this Grindelia with its globular, many-scaled, sticky involucre and light golden rays, is a beauty. In the same region the Russian thistle has a hold and

Carduus acanthoides flourishes. The persistent rosettes of the last are very large and well suggest the *Acanthus* from which the specific name is derived.

W. W. BAILEY.

BROWN UNIVERSITY, September 14, 1906.

AN ADDITION TO THE FLORA OF BLOCK ISLAND. — The summer flora of Block Island was described, together with a list of species, by W. W. Bailey, in 1893,* and the writer was able to make a few additions to this list during the summer of 1897.† The locality is isolated and absolutely devoid of trees, so that the flora is necessarily very limited and is restricted to such species as can exist on sea beaches or sand dunes, in open swamps or on dry hills. In the latter habitat a few of the species which were established there when the region was covered with trees still persist, and among these it is interesting to note that this year I found numerous specimens of *Botrychium obliquum* Muhl., on the summit of Mohegan bluffs, where it occurs as part of the dense mat of vegetation, consisting largely of *Solidago nemoralis* Ait., *Aster vimineus* Lam., *Achillea Millefolium* L., *Potentilla canadensis* L. and *Panicum dichotomum* L., which covers the hill-tops.

ARTHUR HOLLICK.

NEW YORK BOTANICAL GARDEN.

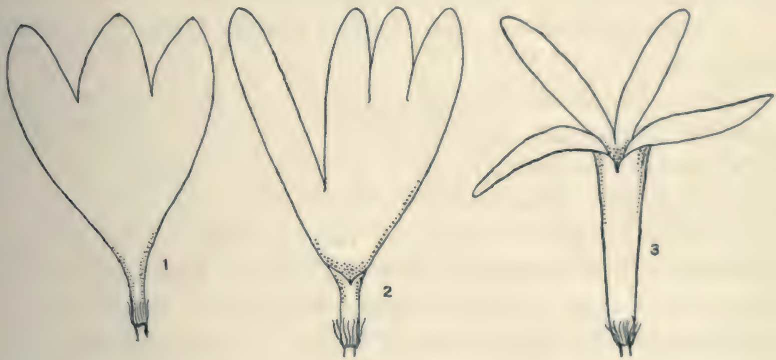
TUBULAR RAY-FLOWERS IN GAILLARDIA ARISTATA. — Among several specimens of *Gaillardia aristata* Pursh, collected near Magnolia, Colo. and Eldora, Colo., a few were found in which the ray-flowers had a tubular form. *Gaillardia aristata* is a very conspicuous species in this region, ranging from the plains to an altitude of 10,000 feet. Examination of the specimens in the University herbarium shows none having these tubular rays. It therefore appears that the abnormality is not common.

The specimens agree with the description given for this species by Britton and Brown in every particular except in the rays. Some of the rays are normal 3-lobed rays, one of which is represented in FIGURE 1. On the same flower-head were found intermediate forms as shown in FIGURE 2, alongside tubular rays as

* Bull. Torrey Club 20: 227–239. 1893.

† Ann. N. Y. Acad. Sci. 11: 63–70. 1898.

shown in FIGURE 3. Most of the rays were 5-lobed; some 4- and 6-lobed. Ordinarily the ray-flowers of this species have neither stamens nor pistils, but some of the tubular ray-flowers examined had both sets of organs well developed.



Ray-flowers of *Gaillardia aristata*.

Professor E. A. Kenyon, of Florence, Colo., reports having found similar individuals of this species near Eldora, Colo.

W. W. ROBBINS.

UNIVERSITY OF COLORADO,
BOULDER, COLO.

MYCOLOGICAL NOTES FROM INDIANA — I. *Peronospora Floerkeae* Kellerm.

On the 28th of May a locality near Carmel, Hamilton Co., from which *Floerkea* had been collected in previous years was visited in hopes of finding this fungus. Although the season for the host was well-nigh past, careful search revealed a few plants which were infested. The material contained no conidia and but few oöspores, hence no cultural experiments could be undertaken to determine the true systematic position of this interesting species. In the original description the statement is made that "the host plants are dwarfed by the parasite though not distorted, and usually the entire plant harbors the fungus — all parts of the stem and leaves being evenly, though in the main rather sparsely covered by the conspicuous conidiophores. . . . Later infection is often restricted to the lower leaves of vigorous hosts but such cases

are the exception rather than the rule." * This material, while agreeing with the original description in taxonomic characters, differs materially in the matter of distribution, being very local in occurrence and confined in the main to the upper fourth of the host, upon which it produced no dwarfing effect.

2. *Hydrogera Kleinii* (van Tiegh.) Kuntze (*Pilobolus Kleinii* van Tiegh.).

During September and October last, the form *sphaerospora* Grove of this species was abundant on horse dung in the vicinity of Lafayette. As the only point of difference between this and the typical form of the species is the shape of the spores observations were made to determine the taxonomic value of this character. The sporangia which mature first from any spore-germination contain globular spores while those which mature later contain the typical elliptical spores. The fresher the substratum the greater is the proportion of spherical spores. The form in question is therefore not taxonomically distinct from the typical form. While *Hydrogera* has frequently been reported from the United States, no mention of this species has come to my notice.

3. *Stamnaria americana* Massee & Morgan.

This species was first collected by Morgan at Preston, Hamilton Co., Ohio, and later distributed by Kellerman from Hocking Co. † During the present spring it was collected sparingly on *Equisetum hyemale* at Lafayette.

GUY WEST WILSON.

NEW YORK, September 10, 1906.

A HITHERTO UNNOTICED RELATION BETWEEN VIOLA PEDATA AND IRIS VERNA. — In April, 1906, among the pine‡-clad mountains of eastern Alabama, two of the most common and conspicuous herbs on dry sunny slopes were *Viola pedata* L. and *Iris verna* L. These species were in full bloom at Easter time in Talladega, Clay, and Tallapoosa Counties, and often grew within a few feet of each other, their habitats being identical.

* Journ. Myc. 10 : 171.

† Ohio Fungi 18.

‡ Long-leaf pine, *Pinus palustris*.

Far apart as they are phylogenetically, they resembled each other in still other ways besides habitat and time of flowering. The flowers of both were about the same distance from the ground (four or five inches), borne singly on erect scapes, and, what is more remarkable, colored almost exactly alike. Most persons in the Eastern United States are familiar with the appearance of *Viola pedata.* In the *Iris*, likewise, the petals are pale-blue for the greater part, and white toward their bases. The yellow anthers of the violet are matched by yellow crests on the petals of the iris; and the whole aspect of the two plants is so similar that it is difficult to distinguish them at a few rods distance. Stranger still, the two deep-purple petals occasionally seen in *Viola pedata* have a counterpart in an occasional streak of similar color at the tips of the petals of *Iris verna.*

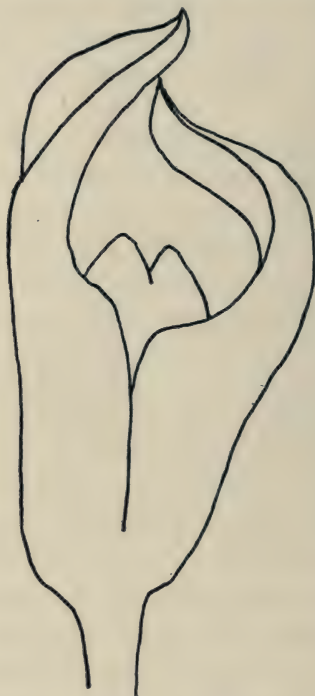
The points of similarity between these two species are too numerous and striking to be considered merely fortuitous, and yet when we attempt to explain them we are confronted at once with the difficulty of distinguishing between cause and effect. There can be little doubt that both plants are pollinated by the same insects (though direct evidence on this point is lacking), and any complete explanation of the phenomena noted will probably have to take this into consideration. *Viola pedata*, it should be observed, is one of the few violets which have no cleistogamous flowers and therefore presumably depends entirely on insects for pollination.

Analogous resemblances in the same general region are not wanting. For instance, *Lonicera sempervirens*, *Bignonia crucigera*, *Spigelia marilandica* and *Aesculus Pavia*, which grow on bluffs in various parts of Georgia and Alabama, all bloom in late spring and have red flowers about two inches long, more or less yellowish at their extremities.* *Illicium floridanum* has nearly the same habitat and time of flowering and its flowers are of the same color but differently shaped. ROLAND M. HARPER.

FASCIATIONS IN ARISAEMA, RUDBECKIA, AND VIOLA. — An interesting case of fasciation in *Arisaema triphyllum* was brought

* See Ann. N. Y. Acad. Sci. 17: 105. 1906. [Ined.]

to me by a student a few days ago. (She called it "Siamese-twin Jack-in-the-pulpit.") Thinking the readers of TORREYA might be interested, I sketched it off and send it to you. While



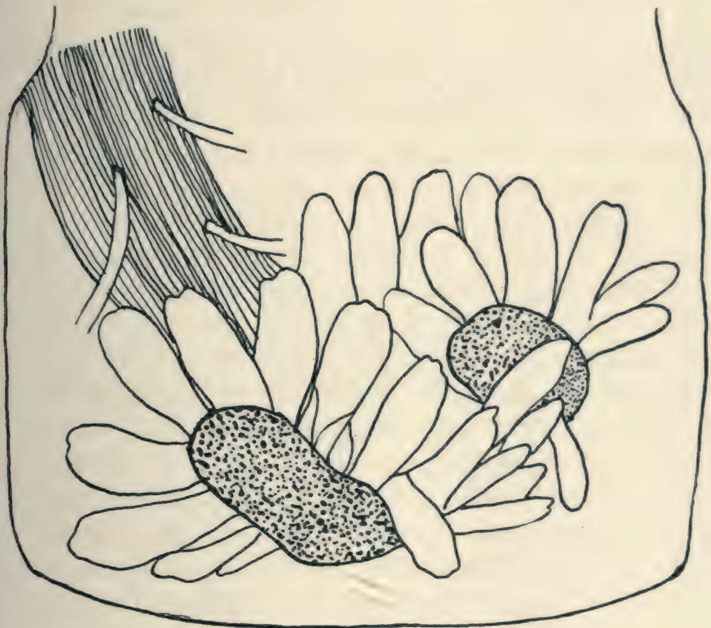
Fasciation in *Arisaema*.

the spathe is separated all the way down, the spadix bears only a slight indentation.*

Two summers ago at Cold Spring Harbor, I found an illustration of fasciation in a *Rudbeckia hirta*. The disk was elongated, making three turns of a spiral and would measure at least four inches in length I should say, though the width was normal. The plant stem was three quarters of an inch wide and perfectly flat.

* W. W. Bailey (Bot. Gaz. 9: 177. 1884) alludes to a specimen of *Arisaema triphyllum* from Minnesota, with a "double spathe including a single spadix." Miss Alice G. Clark of East Weymouth, Mass., describes and illustrates (Rhodora **6**: 163. 1904) an *Arisaema* inflorescence with two spathes and three spadices.

The accompanying sketch of the specimen as it lies in the preserving jar, may serve to give some idea of its appearance though it shows only the two ends of the disk. I have also indicated the position of the three leaves which show in this view.*



Fasciation in *Rudbeckia hirta.*

A third fasciated blossom was brought to another of our teachers, Miss Ida Clendenin. It is a *Viola tricolor* but the petals were so rolled up that it is impossible to draw it. There are in all seven stamens and nine petals. Each single pansy has but one perfect upper petal, but a small abortive one seems to represent the two missing ones. There is only a slight broadening of the stem in this case, but a series of enlargements at intervals of a half inch give the stem a jointed appearance. There is also a deep groove in the ventral side. LOUISA BRUCKMAN.

GIRLS' HIGH SCHOOL, BROOKLYN,
May 21, 1906.

* W. W. Bailey (Bull. Torrey Club **8** : 93. 1881) notes fasciation in *Rudbeckia hirta*, "four heads" being united. Later (Bull. Torrey Club **18** : 374. 1891), he describes another case with stem "at its narrowest part over an inch in width" and mass of heads "all of five inches across."

NEWS ITEMS

H. H. York, A. M., fellow in botany in Columbia University during the past college year, has been appointed instructor in botany in the University of Texas.

Miss Winifred J. Robinson, instructor in biology in Vassar College, spent her summer vacation at the New York Botanical Garden, engaged chiefly in studies of Hawaiian ferns.

Dr. Ira D. Cardiff, who has been assistant in botany in Columbia University for the last two years, has accepted an appointment as professor of botany in the University of Utah at Salt Lake City.

Dr. and Mrs. N. L. Britton, Professor L. M. Underwood, and Miss Delia W. Marble sailed for Jamaica on August 25 for a month of botanical exploration among the mountains of the island. Professor Alexander W. Evans of Yale University went a week in advance, intending to coöperate with the party on its arrival.

Dr. Pehr Olsson-Seffer, director of La Zacualpa Botanical Station, Escuintla, Chiapas, Mexico, was in New York in the early part of September. He was planning to sail from San Francisco about September 14, to visit Hawaii, the Philippines, the Straits Settlements, and Java, in the interests of tropical agriculture, with special reference to the rubber and coffee industries.

Professor Douglas H. Campbell of Stanford University has returned to his duties after a sabbatical year of absence during which he has made a tour of the globe, visiting South Africa, Ceylon, Java, and other regions of peculiar botanical interest. During the present year, Professor William R. Dudley of the same university is on a leave of absence.

The *Journal of Botany* for September records the death of Mr. Charles Baron Clarke, which took place at Kew, England, on August 25, and of Professor H. Marshall Ward, which occurred at Torquay on August 26. Mr. Clarke was born in 1832 and was especially well known through his studies of the Cyperaceae. Marshall Ward was born in 1854. In 1895 he succeeded Babington in the professorship of botany at Cambridge, where he gained a distinguished reputation as a teacher. Papers on parasitic fungi and plant pathology and hand-books of grasses and of trees are among his best-known writings.

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TORREYA

October, 1906

MIDWINTER OBSERVATIONS IN SOUTHEASTERN MISSISSIPPI AND EASTERN LOUISIANA

By Roland M. Harper

On the way to and from the meetings of the American Association for the Advancement of Science in New Orleans last winter I passed through some parts of Mississippi and Louisiana which have rarely if ever been mentioned in botanical literature, and were of particular interest for that reason, as well as for their similarity to some parts of the coastal plain of Georgia which I had been studying for several years; and I was able to make a few observations *en route* which seem worth preserving.

Although many plants from various parts of Mississippi — chiefly from along the coast — have been distributed in recent years to the larger herbaria of the country by Tracy, Earle, Pollard, Kearney, Lloyd and others, none of these specimens that I have seen are accompanied by any information as to their surroundings in nature, and very little has been published about the vegetation of the Mississippi mainland in modern times. In fact there seems to be as yet no better account of the phytogeography of the whole state than Dr. E. W. Hilgard's "Report on the Geology and Agriculture of the State of Mississippi," which appeared in 1860. And in this admirable work, though the descriptions of purely geographical features can hardly be improved on even at the present day, the native plants are mentioned only incidentally, and a complete enumeration of them is not attempted. Moreover, this report was written when there was no better manual for the region than Torrey & Gray's

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uncompleted Flora of North America, so it is not surprising that a good many of the plants were wrongly identified by Dr. Hilgard, through no fault of his.

In view of these conditions any one entering the state of Mississippi for the first time can hardly have a very definite idea of what to expect there in the way of vegetation. Louisiana is still more of a *terra incognita* phytogeographically, though from the standpoint of the systematist there is perhaps not much more botanical work to be done in either state, since nearly all the indigenous species are doubtless already known to science. The following fragmentary notes, though made at the most unpromising season of the year, may contribute in some slight degree to a better understanding of the vegetation (as distinguished from the flora) of this part of the coastal plain.

I entered Mississippi a little south of the middle of its eastern border, in Lauderdale County, in the Lower Eocene region of the coastal plain, on the afternoon of December 26, 1905. From the state line to Meridian, and in fact all the way through Lauderdale, Clarke and Jasper counties, *Pinus glabra* was common * and *Magnolia grandiflora* frequent in hammock lands along streams. These two trees, which have very nearly the same range and habitat, at least in Georgia and Alabama, are probably not found much farther inland in Mississippi than where I first noticed them. *Pinus palustris* was seen occasionally in Clarke and Jones counties, but I had scarcely entered the pine-barrens proper when it became too dark for further observations, the train I was on being unfortunately over an hour late, as is often the case at that season of the year.

The topography of this Eocene region of Mississippi is quite varied, a little more so perhaps than the corresponding parts of Georgia and Alabama. Several inland-facing escarpments (or *cuestas*, as they are sometimes called by geographers) in the vicinity of Meridian are high enough to be known locally as "mountains," and the railroads follow rather sinuous courses in getting over them. A little above Enterprise, in Clarke County,

* Its occurrence in Clarke County is mentioned on page 344 of Dr. Hilgard's book above cited, under the name of "Bottom White Pine."

a creek near the railroad flows for some distance over rocky shoals, * rather an unusual sight in the coastal plain.

The next day, the 27th, was spent in company with Dr. Eugene A. Smith, state geologist of Alabama, in examining some of the geological and botanical features of the northwestern corner of Perry County, between Hattiesburg and Monroe station. Perry County is not only entirely within the pine-barrens, but also in a region analogous to if not continuous with the Altamaha Grit region of Georgia. † Along the Bowie River and some of its tributaries, near Bowie station, is exposed several feet of a soft pale-greenish or yellowish aluminous rock devoid of fossils (known to geologists as the Hattiesburg phase of the Grand Gulf formation), to all appearances identical with the outcrops of Altamaha Grit on banks of streams in southeast Georgia, four or five hundred miles farther east. But there are certain differences in the topography and flora in the two states which I am not quite prepared to explain. For instance the creeks and small rivers in this part of Mississippi have pretty well defined "second bottoms" along them, with a sort of hammock flora, including among other things *Fagus americana*, *Illicium floridanum* and *Kalmia latifolia*, ‡ species which I have never seen in the Altamaha Grit region of Georgia, though the *Fagus* and *Kalmia* come right up to its borders. Similar bottom-lands with about the same vegetation can be seen at a number of places in southern Alabama.

The flora of dry pine-barrens on the neighboring hills seems very similar to that in the corresponding parts of Georgia and Alabama, § as nearly as I could determine at that season, but moist pine-barrens and branch-swamps are very poorly developed in that vicinity, probably because of the absence of the super-

* Prof. S. M. Tracy has distributed specimens of *Podostemon abrotanoides* Nutt. (*nos. 3257* and *3258*, collected June 12, 1897) from the vicinity of Enterprise, which presumably came from this place or one very similar.

† See Bull. Torrey Club **32**: 141–147. 1905.

‡ For a list of some other woody plants growing in such situations see page 349 of Dr. Hilgard's report.

§ *Aster adnatus*, *Helianthus Radula*, *Myrica pumila*, *Quercus marylandica* and *Q. digitata* were some of the species noted.

ficial layer of Columbia sand, which in most of the little valleys in the pine-barrens of Georgia holds water like a sponge, allowing the development of a rich and characteristic bog flora. A mile or two west of Hattiesburg I noticed a good many specimens of *Pinus Elliottii*, both young and old. This is a little out of the range usually given for this tree, and probably near its northwestern limit.

The appearance of Hattiesburg itself would to a careful observer indicate the close analogy between this part of Mississippi and the Altamaha Grit or wire-grass region of Georgia. Like many of the newer cities in "Wire-grass Georgia," Hattiesburg (which is larger than any of them) owes its existence and rapid growth primarily to *Pinus palustris*, but is no longer dependent on this diminishing source of wealth. Its neat and prosperous appearance is well matched by most of the cities in the corresponding part of Georgia, but not altogether by those in the Lower Oligocene pine-barrens a little farther inland.

Going from Hattiesburg to New Orleans on the morning of the 28th, I passed through a country resembling Southeast Georgia even more closely than that seen the day before. The topography which came into view at daybreak, about thirty miles southwest of Hattiesburg, seemed almost a perfect match for that which I consider typical of the Altamaha Grit region.* Branch-swamps are well developed, and contain apparently about the same kind of vegetation as is found in similar situations in Georgia, though perhaps not quite so many species, on account of the greater distance from the centers of distribution of pine-barren plants. The prevailing trees in the branch-swamps seemed to be *Pinus Elliottii*, *Nyssa biflora*, *Liriodendron Tulipifera* and *Magnolia glauca*.

The rolling topography continued without much variation the rest of the way across Mississippi, but immediately on crossing the Pearl River into Louisiana the aspect of the country changed considerably. All the way between the two channels of this river, a distance of five or six miles, there seemed to be nothing but

* The topography and other geographical features of a region midway between Hattiesburg and New Orleans are described by Smith and Carter in the soil survey of the McNeill area, Mississippi (Field Operations of the U. S. Bureau of Soils for 1903).

swamps, hammocks and bottom lands, containing such trees as *Taxodium distichum*, *Betula nigra*, *Quercus laurifolia*, *Magnolia grandiflora*, *Liquidambar*, *Ilex opaca* and *Nyssa uniflora*, all more or less draped with *Tillandsia usneoides*. No *Platanus* was seen, probably for the same reasons that it is almost wanting in the pine-barrens of Georgia and Alabama, even along the larger rivers.* Between the Pearl River and Lake Pontchartrain are extensive flat wet pine-barrens, very much as in the maritime counties of Georgia.† *Pinus Elliottii*, which comes within two or three miles of the river on the Mississippi side, was not seen in Louisiana, where *P. Taeda* largely takes its place (as it does also in the Carolinas). Here I noticed *Taxodium imbricarium* ‡ for the first time on this trip, a few specimens between Alton and Slidell.

On approaching Lake Pontchartrain the pine-barrens pass rather suddenly into salt (or brackish ?) marshes, without any other "plant-formation" intervening. The same phenomenon was soon afterward observed on the Mississippi coast, though in Georgia there seems to be always at least a mile of live-oak hammock or something of that sort between the pine-barrens and the marshes. The reason for this difference is as yet obscure.

After crossing a few miles of marshes, five or six miles of open water, and then a few miles of cypress swamps, New Orleans was reached. The country around New Orleans is of course very flat, and the surface all Quaternary alluvium. During my stay there the only natural plant-habitats which I was able to find in the vicinity were the cypress swamps. These are doubtless well known to most of the botanists who have visited New Orleans or resided there, but they are rarely if ever adequately described. They probably once covered the whole country for miles around, except the slightly higher areas near the river which are said to have formed§ natural levees. Going due north from the city to

* See Bull. Torrey Club **32** : 147. 1905.

† See Ann. N. Y. Acad. Sci. **17** : 19–20. 1906.

‡ See Bull. Torrey Club **29** : 383–389, 393–399 ; **32** : 105–115.

§ In the soil survey of the New Orleans area (Field Operations of the U. S. Bureau of Soils for 1903) these swamps are mapped as "Sharkey Clay" and "Muck," and are said to cover about 68 per cent. of the area around New Orleans. A crude description of their vegetation is also given.

West End on Lake Pontchartrain one passes through several miles of these swamps, which are practically untouched except for having had a few of the cypress trees cut out. At the time of my visit they were full of water, but I was told that they sometimes become dry enough to walk about in.

The three most abundant and conspicuous plants in the cypress swamps are *Tillandsia usneoides*, *Taxodium distichum* and *Sabal*

FIGURE 1. Scene in the pine-barrens near 18th St. and 32d Ave., Gulfport, Miss., within half a mile of the Gulf, looking west, Jan. 3, 1906. *Pinus palustris*, *Serenoa* and *Quercus Catesbaei* in dry pine-barrens in the foreground. Denser vegetation along a small stream at the right, including the three commonest trees of such situations, *Pinus Elliottii*, *Magnolia glauca*, and *Nyssa biflora*.

Adansonii, the first two giving an indescribably weird and somber aspect to the winter landscape. Other species noted at the same time and place were three small trees, *Salix nigra*, *Acer rubrum* and *Fraxinus caroliniana* (?), one shrub, *Baccharis halimifolia*, and the following herbs (all but one of them monocotyledons): *Typha latifolia*, *Limnobium Spongia*, *Sagittaria lancifolia*, *Zizania aquatica*, *Panicum gymnocarpon*, *Cladium effusum*, *Pontederia cordata* and *Hibiscus* sp. All of these have a pretty wide distribution, being found also near the Georgia coast, though not associated in the same way there, for these swamps seem to have no counterpart much farther east.

Whatever natural plant-communities may have originally occupied drier ground in the immediate vicinity of New Orleans have probably long since disappeared, for dry land is of course at a premium there.

Leaving New Orleans on January 3, 1906, I went eastward along the coast to Mobile, stopping about an hour and a half at Gulfport, Mississippi. All along the Mississippi coast the pine-barrens, which are rather flat, come very close to the shores of the Gulf, sometimes within a few hundred feet.

On the way to Mobile I first noticed *Pinus Elliottii* near Waveland, in Hancock County, Mississippi, *Serenoa serrulata* on the eastern shore of Bay St. Louis, in Harrison County, and *Quercus geminata* between Pass Christian and Long Beach, in the same county. Whether these species extend farther west or not I am not informed. All three of them, it should be observed, seem to be almost confined to the Columbia sand, which is probably not very well developed in Louisiana.

At Gulfport,* where I had a few minutes in which to examine the pine-barrens near the city, I could detect a faint development of the same sort of topography which characterizes the Altamaha Grit region of Georgia. † Among the plants noted in the

* A short description of Gulfport, from the popular or commercialistic standpoint, can be found in the Review of Reviews (33: 194, 195) for February, 1906.

† See Bull. Torrey Club 32: 146. 1905. The descriptions of the topography, vegetation, industries and other geographical features, in the soil survey of the Biloxi area (which includes Gulfport and most of Harrison County) by Hearn and Carr (Field Operations of the U. S. Bureau of Soils for 1904), would fit some parts of southeast Georgia almost exactly.

environs of Gulfport was that little-known *Sarracenia* which until recently was confused with *S. flava*. (I saw it also the next day in the northwestern part of Mobile County, Alabama.) Prof. J. M. Macfarlane * has pointed out its distinguishing characters, but in view of its present known range his referring it to *S. Catesbaei* Ell. seems unwarranted. According to his (unpublished) observations it does not occur east, nor *S. flava* west, of the Alabama River; and since traveling through most of the coastal plain counties of Alabama I can offer no evidence to the contrary.

Between Gulfport and Biloxi the country looks much like the flat pine-barrens 50 to 100 miles back from the coast in Georgia, and the vegetation is also very similar. Shallow ponds, with *Pinus Elliottii*, *Nyssa biflora* and *Ilex myrtifolia*, are frequent, and *Taxodium imbricarium* was seen a little west of Biloxi. In most places the pine-barrens are not yet even turpentined (which is rather unusual at the present day), though this railroad has been in operation about 35 years, it is said.

Soon after entering Jackson County (just across a narrow bay from Biloxi) the "pine meadows" which have been described by Hilgard † and others ‡ began to appear, and they continued most of the way to the Alabama line. In these park-like "meadows" (which by the way have no exact counterpart in Georgia) there are almost no trees except *Pinus palustris* and *P. Elliottii*, and these are of low growth, only thirty or forty feet tall. The only evergreen shrubs noticed were *Ilex glabra* and *Serenoa*. The surface of the country is very flat, with few streams, and the superficial sand seems to be thinner than it is a little farther west, or perhaps entirely absent. Many of the trees, doubtless the larger ones, have been cut out, but the region is very sparsely settled, and sometimes no houses, roads or fields were visible for several miles. At present these pine meadows do not seem to be utilized for anything but sheep ranges.

Why the pines are so stunted in such places I was not able to

* Trans. and Proc. Bot. Soc. Pa. 1: 426–434. 1904.

† Geol. and Agric. Miss. 370, 371. 1860.

‡ E. A. Smith, Geol. of the Coastal Plain of Ala. 101. 1894.

determine by merely passing through on a fast train, but it seems likely that the land is a little too flat and wet for the best development of *Pinus palustris* and a little too dry and perhaps not sandy enough for *Pinus Elliottii* to grow well, and that no other trees have happened to gain a foothold. The winds from the nearby Gulf may have something to do with keeping the pines down to a uniform height.

In the southeastern part of Jackson County, near the Alabama line, *Taxodium imbricarium* is quite common in ponds. Before making this trip I had no definite information as to its occurrence farther west than Alabama, except Dr. Hilgard's mention of cypress ponds in the maritime counties of Mississippi.*

OBSERVATIONS ON THE OCCURRENCE OF BOOTT'S FERN

By Philip Dowell

These observations are quite limited, both in regard to the time and the area covered, more limited than might be desired for publication, but they may serve to bring out others more exhaustive and thus help to further our knowledge of the origin and distribution of *Dryopteris Boottii* (Tuckerm.) Underw. They are recorded now partly in response to an appeal made in the *Fern Bulletin* by Professor A. B. Klugh for further information in line with his own observations on this fern.† Speaking of the occurrence of the fern in Ontario he says: "It never occurs in any abundance, most usually in a single plant . . . it is exactly intermediate between its possible parents . . ."

I find no record of the fern having been found on Staten Island before 1903, when a single clump of three plants was found in a woodland swamp near South Avenue. This is a remnant of virgin forest and is a favorable place for the Goldie, Clinton, crested,

*Op. cit., pp. 367, 368. The "long-leaf pine" mentioned by Dr. Hilgard as growing in the same ponds is of course *Pinus Elliottii*, which was not recognized as distinct until twenty years later.

† *Fern Bulletin* 13: 86. Jl 1905. 14: 70. Jl 1906.

and the spinulose ferns, which all grow here within a small area. Five clumps of *Dryopteris cristata × marginalis* Davenp., as well as a number of more common ferns have also been found on this area.* The swamp is moderately wet, not densely shaded but open enough to support a good undergrowth of grasses and other herbaceous plants besides the spicebush and other small shrubs. This was the only locality known on Staten Island for Boott's fern, until 1905, when I spent the summer on the island and found this fern at other stations. One of these is a little pond near Bradley Avenue, where I found, July 3, a colony of four plants, one of them several feet from the rest, growing on the grassy border of the pond. This is a sparsely shaded border covered with grass and other small undergrowth with a few plants of *Dryopteris cristata* (L.) A. Gray and one plant of *Dryopteris spinulosa* (Retz.) Kuntze. In the next locality in which the fern was found, on August 2, 1905, there were several plants of *D. Boottii* with *D. cristata* and *D. spinulosa* growing on grassy tussocks or at the bases of willows in a small swamp that has standing water most of the year. This swamp is below Ocean Terrace, west of Dongan Hills. On the following day (August 3) I found the fern at Bull's Head in the more open part of a large grassy swamp in which there is quite an abundant growth of *D. spinulosa* with an occasional *Dryopteris spinulosa intermedia* (Muhl.) Underw. and several plants of *D. cristata*. Three clumps of *D. Boottii* were found at this station growing several feet apart. Two weeks later (August 17) several plants of the fern were found growing on both sides of Ketchum's Mill Pond Brook, west of Richmond. In the swampy places along this brook *D. spinulosa* is abundant, and the subspecies *intermedia* is frequent. *Dryopteris Clintoniana* (D. C. Eaton) † and *D. cristata* also grow here, the latter comparatively abundant. This swamp is more shady than the others mentioned and thus less grassy, portions of it are more densely covered with underbrush, and it is moderately wet. Here I have counted at one time as many as eighteen plants of *D. Boottii* scattered through the swamp. In the first

* See Proceedings S. I. Assoc. 1: 66. 1906.

† See Proceedings S. I. Assoc. 1: 64. 1906.

locality, along South Avenue, I found this summer another plant of this fern several rods away from the first clump found in 1903. This shows that a plant may be easily overlooked in a certain locality, for I have visited this place more often than any other of my fern haunts, each time in the hope of discovering another plant of the fern. It shows also that the fern may be present in other places on Staten Island besides the five stations mentioned, even though it has not been found.

Near Suffern, Rockland County, N. Y., I visited a swamp in company with Mr. Wm. T. Davis, July 23, 1905, and after a short search I found one plant of the fern near one end of the swamp. Near the other end of the swamp there were a number of plants of this fern growing with several plants of *D. cristata* × *marginalis* and others. The latter portion of the swamp had been partially cleared of timber. The main swamp had some large trees and supported a rather luxurious vegetation, consisting largely of ferns. The osmundas and the spinulose ferns were most abundant, as is usual in such a swamp in this region. Then there were the Clinton, Goldie, crested, marginal and other ferns.

On September 3 of the same year Mr. S. C. Edwards took me to a swamp near Lisle, Broome County, N. Y., where we spent about an hour climbing about on fallen trees and mossy hummocks over the boggy ground, and we found a colony of two or three vigorous plants of *D. Boottii* among other interesting plants. *D. cristata* and *D. spinulosa* were also present.

In the vicinity of Mountain Lodge, Old Forge, N. Y., during the time of the Symposium this year, I found Boott's fern at four different places, in each of which *D. Boottii* was found more abundant than *D. cristata.* These were open grassy swamps near the borders of lakes or else where the forest had been partly cleared. *Dryopteris spinulosa* was also found in these open grassy swamps; but it was not found in the denser forest where the subspecies *intermedia* abounded.

The most luxuriant growth of Boott's fern that has come under my observation is that of a swamp near Newfoundland, N. J., which Mr. Davis and I partially explored on July 28 of this year, and which I visited again on September 3. We found the

fern comparatively abundant in this swamp, about equally abundant with either of the spinulose ferns. The Clinton fern was somewhat less abundant, and the crested fern proved its presence by two plants found. The swamp is about half a mile long and about ten rods wide, narrowing at the ends. It is a rather wet, half-shaded swamp with little undergrowth of shrubs, but with a few large trees and a herbaceous undergrowth of which the ferns form a prominent part.

Again, under the guidance of Mr. Wm. H. Smith, I found Boott's fern September 8 at Maplewood, N. J. It is true I found only three plants of it, but at the same time I found only one of the crested fern and only a few spinulose ferns. The main part of the swamp visited has been cleared of timber and is overgrown largely with weeds, chiefly *Polygonum arifolium* L., so the conditions are no longer favorable for swamp wood-ferns.

From my observations I am led to believe that where the conditions are favorable for the crested fern or for the Clinton fern, Boott's fern is likely to occur. These ferns seem to require similar conditions. Boott's fern and the crested fern appear to me to be closest in their requirement of light, since they are found in open sunny places where the Clinton fern does not usually grow. These ferns are more rare in their general distribution in this region than either of the spinulose ferns and may be classed among the rarer ferns. On the other hand any one of the three is less rare than Goldie's fern in the localities I have examined. I have found the crested fern in more localities than Boott's fern, and the latter in more places than the Clinton fern. In regard to the question of hybridity I can neither prove nor disprove the theory. The fact that *D. cristata* and *D. spinulosa* occur with *D. Boottii* may mean simply that these ferns require similar conditions. On the other hand attention might be called to the fact that their position in swamps or on the border of swamps or of ponds is favorable for the mingling of the spores or of the gametes during the seasons of the year when there is considerable water present. That Boott's fern "is exactly intermediate between its possible parents" can not be taken too literally, and this is a point against the theory of the hybrid origin of the fern.

D. Boottii has been described as a variety of *D. spinulosa* and as a variety of *D. cristata*, and it has been considered by many a hybrid between these two. The scales of *D. Boottii* are more abundant and of a darker brown than in either of the other two, and it is glandular, a characteristic which is absent in the other two. These objections may be met by considering as one of the parents *D. spinulosa intermedia* instead of *D. spinulosa*. Another respect in which *D. Boottii* differs from the other two is the position of its sori nearer the midvein than in either of the others. In this it is not intermediate between its supposed parents. Experiments may prove *D. Boottii* to be a hybrid, if this fern can be produced by crossing its possible parents, but until that is done we are not justified in concluding that it is a hybrid. It is to be hoped that the question may appeal to some one in a position to perform such experiments. I trust also that others who have had the opportunity of observing *D. Boottii* in the field will publish such observations.

Port Richmond, N. Y.
September 8, 1906.

SHORTER NOTES

Note on the Identity of Trillium obovatum Pursh. — I have observed in the July *Bulletin of the Torrey Botanical Club* that Dr. H. A. Gleason, in his treatment of the pedunculate species of *Trillium*, has made an error which I think should not go uncorrected. He has made *T. obovatum* Pursh a synonym of *T. erectum* L., and makes the statement that " it had white, obovate petals." There is nothing in Pursh's Latin description of his *T. obovatum*, page 245 of the Flora Americae Septentrionalis, to indicate the color of the petals ; but on page 246, in his English notes, he distinctly states that the flowers are " dark rose-colored," suggesting that they might be white when first opening.

There is in the vicinity of Detroit a trillium that agrees exactly with Pursh's description of *T. obovatum* and undoubtedly is that species which, however, should be referred to *T. grandiflorum* Salisb. and not to *T. erectum* L. The flowers, on the

average, are only about one-half as large as those of *T. grandiflorum* and are rose-colored from the time they open. The smaller flower and coloration are permanent features of this form and therefore, it seems to me, it merits rank as a variety under *T. grandiflorum;* this rank was given it in Vol. 2 of the Proceedings of the Michigan Academy of Sciences.

O. A. FARWELL.

HERBARIUM, PARKE, DAVIS & CO.
DETROIT, MICHIGAN.

LESPEDEZA SIMULATA IN NEW JERSEY. — Several years ago Mr. B. F. Bush and myself in a paper on the Lespedezas of Missouri (Trans. Acad. Sci. of St. Louis **12**: 18) described as new *Lespedeza simulata.* The range of the species then known to us was Missouri and Indian Territory. Later, Dr. Britton in the appendix to the second edition of his Manual of the Flora of the Northern States and Canada (p. 1068) extended the range of the species to southern Pennsylvania, while Dr. Small in his Flora of the Southeastern United States (p. 642) further extended the range to Arkansas and Texas.

Last year while botanizing late in the fall near Harworth, Bergen County, New Jersey, I came across one plant of what seemed to be this species. It was, however, in poor condition, and accordingly I waited until this year to make certain of its identity. This year the species was quite abundant in the locality visited the previous year, and I secured a good series of specimens. This New Jersey plant seems undoubtedly referable to the above species, and is a pleasing addition to our local flora.

The plant occurs in an open rocky field with such plants as *Lespedeza capitata* Michx., *Solidago juncea* Ait. and *Solidago nemoralis* Ait. Being the only appressed-pubescent species with purplish flowers on peduncles shorter than the leaves and having sepals nearly as long as the pods, it is readily distinguished from all other species of this genus. Although so widely distributed it is either rare or often overlooked, as it seems to be comparatively little collected. I have never seen it in any other place in New Jersey, and unfortunately it is liable to be soon killed in the

locality mentioned above, as a real-estate company is at present engaged in laying out an addition in the field in question.

KENNETH K. MACKENZIE.

49 WALL ST., NEW YORK CITY.

FURTHER NOTE ON THE FORMATION OF AERIAL TUBERS IN SOLANUM. — In connection with the article on "Tuber-formation in *Solanum tuberosum* in Daylight," in the preceding number of TORREYA, two recent illustrated papers,* not referred to in that article, are of considerable interest.

Referring to the fact that the production of aërial tubers by *S. tuberosum* has been repeatedly noted in scientific journals and horticultural publications (no references are given), Vilmorin states that he himself has observed it in the varieties "Cardinal," "Giant Blue," and the "Wonder of America." The anomaly is more apt to occur on varieties having colored tubers than on those having white ones, and the aërial tubers form preferably when the vegetation is exuberant on account of the moist condition of the soil. They arise, he says, "on the lower part of the stem in the axils of the leaves, and resemble secondary branches hypertrophied and swollen with reserve food. Furthermore, if a branch of a given variety of potato is buried, tubers will form at that region before the plant has produced them on the subterranean branches properly so-called."

It is also stated (again without exact reference) that another observer saw a plant that had all the specific characters of *Solanum tuberosum* L. give rise to an authentic tuber of *S. Commersoni* Dunal. "If," says Vilmorin, "that was its exact origin, which I do not yet believe, we have without doubt to consider a problem very interesting for botany and very disquieting for nomenclature: the spontaneous passage of one species into another without the crossing of a single sexual generation."

Such an extraordinary case of discontinuous variation should be authenticated by the strongest evidence.

* Vilmorin, Ph. L. de. Sur les tubercules aériens de la Pomme de terre. Bull. Soc. Bot. France **52**: 535. 1905.

Labergerie, M. Tubérisation des Tiges aériennes des variations du Solanum Commersoni. *Ibid.*, **53**: 179. 1906.

Continuing, the writer describes and figures a most interesting sport in the "Giant Blue" variety of *S. tuberosum.*

"The aërial tubers are formed in the month of September, but not on the principal stem growing from the seed tuber, nor on its branches, but on two branches arising in the midst of an inflorescence. The flowers, as is the case in all cultivated varieties, had fallen without being fertilized, but the peduncles to which they were attached were still green and perfectly distinct. The inflorescences of *Solanum tuberosum* being terminal, it must be admitted that the axes of two of the sterile flowers were prolonged into leafy branches. These branches are remarkable for their size, much greater than that of the main stem below the inflorescence; they bear well-developed leaves in the axils of which are shown the tubers. These, one simple, the other branched, are terminated by a tuft of small leaves, and they would have developed branches if I had not cut them off for preservation in alcohol. Leaves are uniformly present over the surface of the tubers below the buds commonly called 'eyes,' and which in two of the tubers represented in the accompanying figure have developed into secondary tubers." The chlorophyll which has formed in the light has masked the blue color of the tubers.

Labergerie describes the formation of aërial tubers on *Solanum Commersoni.* In this case, he says, the moisture of the soil is an important factor in the development of the tubers, but not the cause of their production. They form in the leaf axils, and also at the extremities of rather long branches. The exact conditions under which they develop has not been ascertained, but they seem to be produced under different conditions from those in the case of *S. tuberosum.*

C. Stuart Gager.

New York Botanical Garden,
October 3, 1906.

FIELD MEETINGS OF THE CLUB

The excursion of August 11 to Great Island, New Jersey, with Dr. Rusby as guide, was unfortunately interrupted by stormy weather before the intended field for observation was reached.

On August 18, Mr. Guy West Wilson, in place of Dr. Rydberg, who was out of town, accompanied representatives of the club to Alpine, New Jersey, by way of the Yonkers ferry.

August 25, Mr. W. W. Eggleston, substituting for Mr. George V. Nash, guided members of the Club to Moonachie, New Jersey. An interesting afternoon was spent in studying the salt-marsh plants. *Blephariglottis ciliaris* was nearly past flowering, but a few good specimens were found. A small patch of *Lacinaria* in brilliant flower, *Helenium autumnale*, *Hibiscus Moscheutos*, *Bartonia tenella* and *Polygonum hydropiperoides* were among the other plants especially noted.

The excursion of September 1 was to Hempstead, Long Island, with Miss Fanny A. Mulford as guide. The storage reservoir was first visited, the region of which combined the flora of the dry sandy woods with that of the open swamp. The genus *Lespedeza* was much in evidence, six species being found. *Eupatorium verbenaefolium*, *E. aromaticum*, *Gerardia tenuifolia*, *Scutellaria parvula*, *Silene stellata*, and *Polygonella articulata* were also observed. The most interesting plant of the Hempstead Plains was perhaps *Gerardia decemloba* Greene, with which *Lobelia Nuttallii* was growing. *Eupatorium hyssopifolium*, *Viola notabilis*, *V. Brittoniana* and *V. Mulfordae* with cleistogamous flowers were other plants of special interest that were collected.

The field meeting of September 8 was at Maplewood, New Jersey. Mr. William H. Smith was the guide. Some interesting botanical ground close to the railway station was first shown, Mr. Smith calling attention to the giant hyssop and mentioning the whorled pogonia (*Isotria verticillata*) as abundant in one spot which was pointed out. The party was next conducted over the brow of the mountain just above the town into a woodland swamp to look for swamp ferns. Besides the osmundas and other commoner kinds, Boott's fern and the crested fern were

found here. This swamp is too extensive to be explored in a short time and would prove interesting ground for further search. The main part of the swamp had been cleared of most of its timber for some years and is not so favorable for the wild plants of the deep woods as it must have been at a former time. It was interesting, though regrettable, to note that most of the open part of the swamp had been overrun by *Polygonum arifolium*, which excluded other plants and formed a dense tangle. A visit to another interesting place beyond this swamp concluded a profitable afternoon's outing.

On September 15 was given the seventh forestry lesson of the special series begun in the spring and discontinued during the summer. The subject of the lesson was "Vegetation of Swamps and Sand Dunes," with Dr. Arthur Hollick as instructor and guide. Ten members were present, and the bench, dune, and salt marsh areas explored extended from New Creek, South Beach, to Midland Beach, Staten Island. The region consists of a barrier beach, with a limited amount of dune sand above high-water mark, and extensive salt marshes on the land side. The salt marsh formerly extended out beyond the present beach line and remains of the old marsh turf or sod were seen exposed at low tide. The beach was formed by sand drifted in by the tides and currents and not by the wearing away of the adjacent meadow land. In places the sand was found drifted by the wind into low dunes about four or five feet high. The formation of the dunes is largely due to the influence of *Ammophila arenaria*, which not only forms extensive mats of roots but also is able to grow upward through sand drifted over it, thus holding the sand in place. Accompanying plants were *Cenchrus tribuloides*, *Solidago sempervirens*, *Myrica carolinensis*, and *Cakile edentula*. On the borders of the the salt marsh, *Baccharis halimifolia* was particularly conspicuous; also, *Iva frutescens*, *Pluchea camphorata*, and *Limonium carolinianum*. A few plants of *Sabbatia stellaris* were found; this has apparently disappeared from areas where it was formerly very abundant. A grove of *Juniperus virginiana* was a conspicuous feature on a slight rise on the salt-marsh border.

The eighth forestry lesson, announced to be given at Fort Lee, New Jersey, on September 22, with Dr. C. C. Curtis as instructor and guide, was prevented by a heavy rain.

On September 29, seven members of the Club held a field meeting at West Orange, New Jersey, under the guidance of Mr. Percy Wilson. The "first" and "second" mountains were visited. *Lycopodium lucidulum*, *Corallorhiza odontorhiza*, *Vitis cordifolia*, and the fringed and closed gentians, were among the plants noted. Some attention was paid to the violets, especially to apparently connecting forms between *Viola sagittata* and *V. fimbriatula*.

NEWS ITEMS

Dr. C. B. Robinson, assistant curator of the New York Botanical Garden, spent the month of August in making collections in Nova Scotia, mostly in the vicinity of Pictou and in Cape Breton.

A recent number of *Science* states that Dr. F. E. Clements has been promoted from the associate professorship of plant physiology in the University of Nebraska to the professorship of the same subject.

Mr. T. S. Brandegee, of San Diego, California, has given his herbarium and botanical library to the University of California. His address is now in care of the botanical department of that University at Berkeley.

Chester A. Darling (A.M., Albion College, 1906) has been appointed assistant in botany in Columbia University to succeed Dr. Ira D. Cardiff, who has been elected to the professorship of botany in the University of Utah.

Dr. Melville Thurston Cook has resigned his position as chief of the department of plant pathology of the Central Agricultural Experiment Station of Cuba. He expects to devote several months to studies at the New York Botanical Garden.

Dr. Raymond H. Pond, professor of botany in the Northwestern University School of Pharmacy, Chicago, Ill., has a year's leave of absence and is now at the New York Botanical

Garden for six months of research, his special subject of investigation being the toxic effect of dissociable salts on enzyme activity.

Mr. Norman Taylor, of the New York Botanical Garden, returned on September 30 from a trip to the Sierra Maestra Mountains, near Santiago, Cuba. Mr. Taylor accompanied Professor B. E. Fernow, of Ithaca, N. Y., who went for the purpose of making a timber survey of this area. During a four weeks' stay in the mountains west of Santiago, collections were made for the Garden Herbarium, together with some live orchids and cactuses for the conservatory. Dr. Fernow gathered much valuable information relative to the Cuban hard-woods, and also made wood sections of the trees of economic importance. A map was constructed of a part of this hitherto almost unknown, but extremely interesting country.

The program of the autumn course of Saturday afternoon lectures at the New York Botanical Garden is as follows:

Oct. 13. "A Summer in Europe; Some Foreign Botanists and Botanical Institutions," by Dr. W. A. Murrill.

Oct. 20. "The Vegetation of the Florida Keys," by Dr. M. A. Howe.

Oct. 27. "How Plants Breathe," by Dr. C. Stuart Gager.

Nov. 3. "Coal: Its Origin and Development," by Dr. Arthur Hollick.

Nov. 10. "The Vegetation and Botanical Features of the Inaguas and Grand Turk, Bahamas," by Mr. G. V. Nash.

Nov. 17. "Recent Explorations in the West Indies," by Dr. N. L. Britton.

Nov. 24. "The Wild Nuts and Grains of North America," by Dr. H. H. Rusby.

The lectures will be illustrated by lantern-slides and otherwise and will begin at 4:30 P. M.

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SOME PHOTOGRAPHS OF THE SILK-COTTON TREE (CEIBA PENTANDRA), WITH REMARKS ON THE EARLY RECORDS OF ITS OCCURRENCE IN AMERICA

BY MARSHALL A. HOWE

A northern visitor in the West Indian islands naturally meets with many trees that are strangers to him and of these the silk-cotton tree [*Ceiba pentandra* (L.) Gärtn. — *Eriodendron anfractuosum* DC.] is one of the most interesting and imposing. In point of size and in other peculiarities the tree is so striking that it has frequently been made the subject of illustration in popular magazines and travelers' guides, and occasionally also in botanical treatises, but at this time of increasing public interest in trees it is hoped that the remarkable characters of the *Ceiba* are sufficient to justify the publication of a few more photographs for the benefit of such readers of TORREYA as have not yet enjoyed the privilege of seeing the tree itself.

Ceiba pentandra is a member of the family Bombacaceae, which is closely allied to the Malvaceae, the family to which belong the plants producing the ordinary cotton of commerce. The seeds of the *Ceiba* are covered with a soft silky fiber which is used for stuffing pillows, cushions, and mattresses. This "floss" is rather too short for weaving, but it possesses an elasticity which adapts it well for use in upholstery. From the East Indies, where also the tree occurs, large quantities of this floss are exported to Europe and America under the Malayan name "kapok," though the fiber of *Bombax malabaricum* and perhaps of other Bombacaceous trees is sometimes included under the same trade-

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name. According to Cook and Collins,* "kapok" from *Ceiba pentandra* and related species is an article of export from the west coast of Africa also.

Perhaps the most impressive feature of the *Ceiba*, apart from its general size and massiveness, is its development, with increasing age, of peculiar wing-like buttresses at the base of its trunk. These buttresses may reach out to a distance of twelve or fifteen feet from the main body of the trunk and may have an altitude of from two to twelve feet, while maintaining an almost

FIGURE I. Trunk and buttresses of the great *Ceiba* standing in the rear of the Public Buildings of Nassau, New Providence, Bahamas. Photograph by Chamberlain.

uniform thickness of only a few inches. The buttresses in a well-developed condition are shown in our FIGURE I, which is from a photograph of the famous and noble tree growing in the rear of the Public Buildings of Nassau, on the island of New Providence, Bahamas. *Ceiba pentandra* is a rapidly growing tree,

*Economic Plants of Porto Rico. Contrib. U. S. Nat. Herb. **8**: 111. 1903.

but this individual, in the opinion of Mr. L. J. K. Brace of Nassau, is "fully 150 years or more old." In the public library at Nassau is a sketch representing "A View of a Silk Cotton Tree in the Island of New Providence, Bahamas, May 12, 1802"; this, by tradition and from general resemblance, is supposed to show the patriarch silk-cotton tree of the island — the one of which the photograph is here published — as it appeared in 1802. The tree at that time, according to the sketch, had young buttresses of a considerable size and in the judgment of Mr. Brace it must have been then at least 50 years old. The tolerably uniform and

FIGURE 2. Another view of the *Ceiba* shown in FIGURE 1. Photograph taken early in March, 1905.

comparatively slight thickness of the buttresses makes it easy to cut out parts of them for use as planks or boards, and in west Africa, according to Cook and Collins (*l. c.*) "pieces of these supporting wings are sawed out and used as doors of native houses."

In the Bahama Islands and in Porto Rico, where the writer has seen the *Ceiba* growing, the tree has a rather short and stout

main trunk of about 12 to 25 feet in height up to the first branches, whence the main axis persists in diminished volume, but usually erect and easily recognizable, to the top of the tree. The main trunk, especially if one includes the basal buttresses, often has an enormous girth. According to Cook and Collins (*l. c.*) "a specimen near Ponce measured 36 meters at 4 feet from the ground, by following the sinuosities of the trunk." The main branches are very long, widely spreading and nearly horizontal, so that the horizontal diameter of the crown is sometimes more than twice as great as the total height of the tree. This feature is excellently illustrated in the Porto Rican tree of which a photograph is published by Cook and Collins (*l. c. pl. 24*) and less well by our FIGURES 2 and 6. The great spreading branches of the tree shown in our FIGURE 3 — a photograph of a tree standing on the bank of a river on the borders of the city of Ponce, Porto Rico — were put to good service at the time of the destructive Porto Rican hurricane and flood in August, 1899, when, it is said, many people saved themselves from drowning by taking refuge among the branches of this great tree. In Cuba and Jamaica, however, according to various reports, the *Ceiba* ("seiba" or "saba") sometimes takes on another form, the massive trunk running up to a height of from thirty to eighty feet * without a branch and then deliquescing into a comparatively small crown. Our FIGURE 4 illustrates such a tree growing at Mandeville, Jamaica. Mr. Norman Taylor, recently returned from a collecting expedition to the Sierra Maestra, near Santiago, Cuba, informs the writer that this form or one with a less flattened crown, is the prevailing one in the forests of that region. Professor Carl F. Baker, botanist of the Estación Agronómica Central of Cuba, also has told the writer that the form with the long trunk and less widely spreading crown is common in other parts of Cuba. The following paragraph from Macfadyen's Flora of Jamaica (93. 1837) gives a graphic description of this tree as it occurs in that island:

"This is a tree of rapid growth, and is readily propagated from stakes or posts planted in the ground. A superb row of these trees at

* Lunan, Hortus Jamaicensis **1**: 243. 1814. Macfadyen, Flora of Jamaica, 92. 1837. Havard, Plant World **4**: 222. 1901.

Belvidere pastures, St. Thomas in the East, was established from posts fixed in the earth, in making a common rail fence. Perhaps no tree in the world has a more lofty and imposing appearance, whether overtopping its humbler companions in some woody district, or rising in solitary grandeur in some open plain. Even the untutored children of Africa are so struck with the majesty of its appearance that they designate it the *God-tree*, and account it sacrilege to injure it with the axe; so that, not unfrequently, not even fear of punishment will induce them to cut it down. Even in a state of decay, it is an object of their superstitious fears: they regard it as consecrated to evil spirits, whose favour they seek to conciliate by offerings placed at its base.''

Ceiba pentandra is one of the few tropical trees which has deciduous leaves, though its habits in this particular are somewhat

FIGURE 3. Base of a *Ceiba* growing on the bank of a river in the city of Ponce, Porto Rico. Photograph taken in June, 1903. Reproduced by courtesy of the *Journal of the New York Botanical Garden.*

erratic — a matter that has recently been discussed in an interesting way by Mrs. E. C. Anthony,* by Mr. O. W. Barrett,† and by Mr. O. F. Cook.‡ The leaves usually begin to fall at about

* Am. Botanist 3: 90. 1902.
† Am. Botanist 4: 91. 1903.
‡ Plant World 5: 171. 1902.

Christmas time or early in January, and the trees are commonly bare the latter part of January and a considerable part of February and March, during which months the numerous pale rose-colored, clustered flowers appear, followed by the pods and the leaves. Individual trees, however, behave very differently from

FIGURE 4. *Ceiba*, at Mandeville, Jamaica.

others. The photographs reproduced in our FIGURES 2 and 6 were taken on the same day early in March in Nassau, but the two trees there represented are shown in quite different guises. The old tree in the rear of the Public Buildings, represented in FIGURE 2, had at the time one large branch which had apparently

retained its old leaves, the remainder of the crown being entirely bare or showing clusters of flowers or young pods, while at the same time the younger tree represented in our FIGURE 6 — a tree growing on the grounds of the New Providence Asylum — was laden with nearly mature pods and showed no leaves at all. Sometimes, according to Mrs. Anthony (*l. c.*), a silk-cotton tree at Nassau may omit entirely the shedding of its leaves during the winter. The bark of the *Ceiba* is covered when young with coarse, sharp-pointed, conical or pyramidal tubercles or spines,

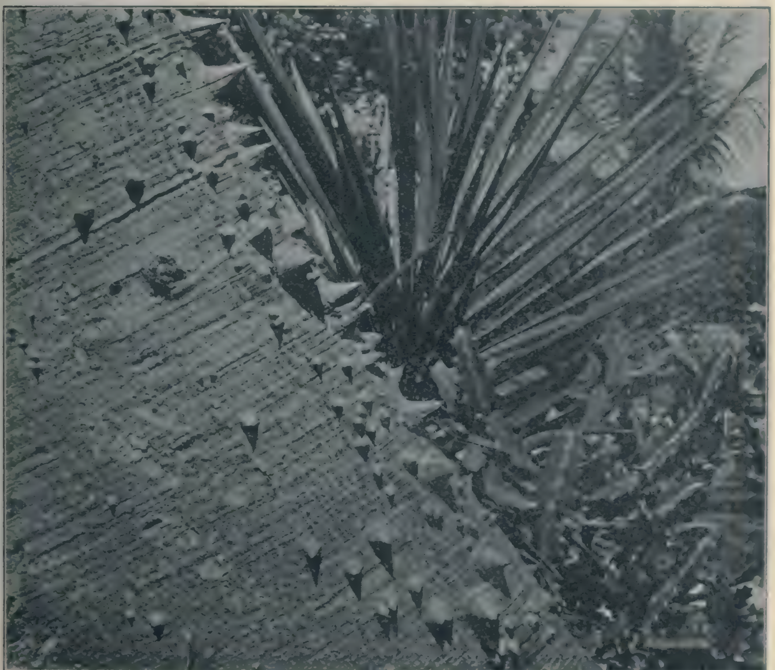

FIGURE 5. Tubercles or spines on the base of a young *Ceiba pentandra* at Nassau, Bahamas.

as represented in our FIGURE 5, but in the older trees these spines, as a rule, are scarcely found unless near the ends of the younger branches, though in this respect the trees show a good deal of individual variation.

Ceiba pentandra is now widely distributed in the tropics, oc-

curring not only in the West Indies and Central and South America, but also in the East Indies and tropical Africa. Taxonomists in attempts to separate specifically the forms growing in these widely separated regions seem able to find no distinctive characters more important than slight differences in the color of the flowers. Varietal and even specific names have been applied to forms of this tree from different parts of the world, but the practically unanimous opinion of botanists at the present day is

FIGURE 6. *Ceiba pentandra* in fruit; on the grounds of the New Providence Asylum, Nassau, Bahamas. Photograph taken in the first week of March, 1905.

that they represent only a single species. It can hardly be supposed that the tree is really indigenous in all these regions, and the question as to its original home thus becomes of interest. The *Index Kewensis* gives its range (under the name *Eriodendron anfractuosum*) as "As. et Afr. trop.," and the idea that the tree is an introduction in tropical America has occasionally found favor in other works. That the tree has been extensively planted in the American tropics is undeniable and its rapid growth and

possession of woolly seeds easily transported by the wind are facts that may be perhaps fairly adduced to account for the presence of very large trees at the present day in forests far from human habitations. Most writers, however, consider that *Ceiba pentandra* is a native of America, and the evidence that can be assembled in support of this view seems fairly conclusive. One fact of some significance is that of the nine species of the genus *Ceiba* recognized by K. Schumann in Engler & Prantl's Die Natürlichen Pflanzenfamilien, the remaining eight are attributed exclusively to the warmer parts of America.

Pickering in his "Chronological History of Plants" (p. 783) states that *Eriodendron anfractuosum* "was carried westward across the Pacific to the Philippines" by the European colonists, and also to the neighboring islands, to Burma, to Hindustan, to equatorial East Africa, etc., though "according to Auld seemingly 'wild in Kandesh.'" Many of the older possible references to this tree in general botanical literature are obscured by confusion with the East Indian tree now known as *Bombax Ceiba* L. (= *Bombax malabaricum* DC.), to which Linnaeus, overestimating the importance of the presence or absence of spines and supposing this Malabar tree to occur in the West as well as in the East Indies, unfortunately transferred the native American name *Ceiba*. In searching through the writings of the earliest American explorers and botanical travelers, one finds a good number of references to trees which may well have been specimens of *Ceiba pentandra*, though many of these references fall a little short of being diagnostic and conclusive. Probably the earliest and certainly one of the most significant of such allusions is found in the "Select Letters of Christopher Columbus" * and occurs in a letter written by Dr. Chanca, physician to the fleet of Columbus on his second voyage to the West Indies, and relating to the island of Española (Santo Domingo). Dr. Chanca wrote:

"We have met with trees bearing wool, of a sufficiently fine quality (according to the opinion of those who are acquainted with the art)

* 66. 1870 [2d Ed.]. Translated and edited by R. H. Major. London (Hakluyt Soc.)

to be woven into good cloth; there are so many of these trees that we might load the caravels with wool, although it is troublesome to collect, for the trees are very thorny, but some means may be easily found of overcoming this difficulty. There are also cotton trees as large as peach trees, which produce cotton in the greatest abundance."

The editor of these letters adds as a footnote after "very thorny" ("muy espinosos"): "A species of the natural order Bombaceae; perhaps the *Eriodendron anfractuosum*." The "muy espinosos" in connection with a wool-bearing tree of Santo Domingo is of especial significance. *Ochroma* and perhaps other native trees of the West Indian region "bear wool," but none of them but *Ceiba pentandra*, so far as we know, is spiny.

Columbus relates in the account of his first voyage that many canoes were found in use by the inhabitants of the islands visited and that these canoes were made of a single piece of timber. The largest of these is referred to in the journal of Columbus for Friday, November 30, 1492, at which time the explorers were at Puerto Santo [Puerto de Baracoa] near the eastern end of Cuba; this canoe, dug out of a single tree, was 95 *palmos* (spans) long and capable of carrying 150 persons. In parts of ancient Spanish America, *ceiba*, *ceyba* or *seiba* (written "seiba" in the older documents of Cuba) * was a native name † for *canoe* and also for a certain large tree; and many of the older writers ‡ associate these large canoes with the tree now known as *Ceiba pentandra*. While possibly this is not the only kind of tree now growing in the West Indian islands which has a trunk sufficiently large for the making of such great canoes, we have the testimony also of various later writers § that the trunks of the *Ceiba* are used for making canoes, and Mr. Norman Taylor, whose return from a recent visit to the Sierra Maestra near Santiago, Cuba, has been referred to above, tells the present writer that he saw dug-out canoes made from the trunks of this tree now in actual use in that region. Professor L. M. Underwood in the course of his visits to Jamaica has been told that canoes are there also still made from the *Ceiba*.

* A. Bachiller y Morales, Cuba primitiva, 242. 1883.

† A. Bachiller y Morales, *l. c.* 234.

‡ Sloane, Nat. Hist. Jam. 2: 72–75. 1725.

§ *E. g.*, Grosourdy, Méd. Bot. Criollo, 2: 375. 1864.

The first historian of the New World, or at least the first who described the trees in much detail, was Gonzalo Fernandez de Oviedo y Valdés, who from 1514 to 1556 served in various capacities as an officer of the Spanish government in Darien, Cartagena, Nicaragua, and Española (Santo Domingo or Haïti). In 1526, he published a "Sumario de la natural y general historia de las Indias," in the course of which he remarks that "the largest tree that I have seen in these parts or in others was in the province of Guaturo." * (He had been speaking of the "Tierra-Firme" and "Darien" and this province was doubtless in the region of the Isthmus.) This great tree had "three roots or parts in a triangle after the manner of a trivet and a space of more than twenty feet was left open between each of these three" basal parts, which were also very high. There is nothing, however, in the further details of this description about the bearing of "wool," and nothing perhaps which would absolutely exclude the possibility of its being a large buttressed *Sterculia*. But in the first part of Oviedo's "Historia general y natural de las Indias," originally published in 1535, there is a chapter "On the tree called çeyba, in especial; and other big trees;" † and in this chapter, which first saw the light only forty three years after the discovery of America, we find vivid and rather detailed descriptions of very large trees, known to the natives as "çeybas," which, in our opinion, could have been nothing other than the trees now known by the name *Ceiba pentandra*, even though two or three minor inaccuracies and misconceptions are to be noted in Oviedo's graphic and manifestly conscientious narrative. This description is of so much interest that we venture to give below a somewhat free translation of it:

"Since writing what I have said of this great tree [*i. e.*, the one in the province of Guaturo, mentioned above], I have seen many others and much greater ones. And it seems to me that the çeybas are for the most part the largest trees of all in these Indies; and this tree is

* Edition seen a reprint in Biblioteca de Autores Españoles **22**: 504. Madrid, 1884.

† El Capitan Gonzalo Fernandez de Oviedo y Valdés. Historia general y natural de las Indias, islas y tierra-firme del mar Oceano. Primera parte, lib. IX, cap. XI. (In edition seen, 1: 342–345. Madrid, 1851.)

of two kinds, one which loses its leaves, and another which never sheds them or remains always green. In this island of Española there was a çeyba, eight leagues from this city, where has persisted the name *Arbol Gordo*, whereof I now speak very often to the Admiral Don Diego Colom, and tell him that he with fourteen other men, touching hands, could not encompass this çeyba that they called *arbol gordo*. This tree died and rotted, but many people are now living who saw it and say the same of its grandeur. For me this is not much of a wonder, recalling the larger ones of these same çeybas that I have seen on the Terra-Firma. There was another great tree of these çeybas in the town of Santiago, in this island of Española; but both this one and the other are much smaller than those that are found on the Terra-Firma.

Since in the province of Nicaragua are the greatest trees which I have seen up to this time and which much exceed all that I have told of, I will now speak only of one çeyba which I saw many times in that province, not half a league from the house and seat of the chief of Fhecoatega, near a river belonging to the district of the chief of Guaçama, who was under the protection of a man of property named Miguel Lucas or of his partners Francisco Nuñez and Luis Farfan. This tree I measured by my own hands with a hemp cord and it had a circumference at the base of thirty-three yards, which equals one hundred and thirty-two spans; and since it stood on the bank of a river it could not be measured low about the roots on that side and it should be without doubt three yards larger; all put together, well measured, I estimate that it was thirty-six yards, or one hundred and forty-four spans, in circumference. This is the largest thing in the tree line that I have seen.

The wood of these çeybas is soft and easy to cut and of little weight and the tree is not held in esteem for building or for more than two purposes. One is its wool and the other the shade, which is extensive, for these are great trees with very spreading branches, and the shade is healthful and not heavy like the shade of other trees that exist in these Indies, which are notoriously harmful; like that of the tree from which is made the poison with which the Carib Indians charge their arrows. The fruit of these trees is a pod, shaped like the largest finger of the hand, but as thick as two fingers, rounded and full of delicate wool; after ripening, these pods dry and open through the heat of the sun, and then the wind carries away the wool, in which are certain little grains which are its seed, as is the case with the cotton. This wool appears to me to be a notable thing and the fruit of the çeyba is after the manner of the bitter cucumbers of Castile, except that the fruits of the çeyba are larger and thicker; but the largest is not longer than the great finger of the hand; and when it is ripe it breaks lengthwise into four parts, and with the first wind is seen the wool (this fruit has nothing else within it) and it looks as if it has snowed wherever the wool has sufficed to cover the ground. This wool is short and it seems to me that it could not be spun into thread; but for bed-pillows and cushions of the drawing-room (free from wet)

it is a wool unique in its softness and without any ill effects to the head, and for the couches of princes the most delicate and estimable of all the wools; it is a silk and even more delicate than the subtile threads of silk. So, no feathers or wool or cotton can equal it; but, if it is wet, it all becomes balled and loses itself. I have experienced all this, and so long as this wool does not become wet there is none like it for cushions and pillows. The Indians in Nicaragua are accustomed to have appointed places for the *tiangüez*, that is to say, the market, where they come together for their gatherings, their fairs, and their barterings, and there they have two, three, and four trees of these çeybas to give shade; and in many plazas or *tiangüez*, two or three or four çeybas suffice to give shade to a thousand and two thousand persons, and they arrange the çeybas according as the concourse of the plaza or *tiangüez* is large or small. This great tree, which in this island [Española], they call çeyba, as I have said, is called *poxot* in the province of Nicaragua and in other parts bears other names."

Bartolomé de las Casas, Bishop of Chiapa, the famous pioneer missionary to the New World and defender of the Indians against their Spanish conquerors, came to Española in 1502, and spent the greater part of his long life in the West Indies, Venezuela, Peru, Central America, and Mexico. His "Historia de las Indias" was known only from manuscript copies up to 1875–76 and seems not to be alluded to by any of the authors who have dealt with the silk-cotton tree, the present writer being indebted to Dr. Manuel Gómez de la Maza, of the University of Havana, for a reference to it. The description of the "ceyba" given by Las Casas is not so detailed as that by Oviedo, yet it is at least of confirmatory interest. A free translation of a part of his description * runs about as follows:

"There is in this island [Española], and commonly in all these Indies, where the land is not cold but rather warm, trees that the Indians of this island call *ceybas*, the letter *y* long, which are commonly so great and of such copiousness of branches and dense leaves that they will give shade for 500 horses, and some will cover much more; it is a very magnificent, showy, and graceful tree; its principal trunk has a thickness of more than three and four oxen, and some are found, and I believe there is one on the island of Guadeloupe, that 10 or 12 men with opened arms and even with two pairs of breeches outstretched could not encompass, and I so affirm. * * * The mast or principal trunk before the branches commence is two to three lances

* Las Casas. Historia de las Indias. Coleccion de Documentos Inéditos para la Historia de España, **66**: 322, 323. 1876. [Apéndice, capitulo XIII].

in height; the first branches commence not from below upward as in other trees, but extend very straight out for such a distance that it seems marvelous that they do not break with the weight that they carry, and it is on this account that they are so capacious and make so much shade; these branches are commonly as thick as a man's body * * *; the leaves are dark-green, delicate and toothed,* if memory serves me well; I do not know that there is in Castile anything to which to compare them, unless it may be, if I am not mistaken, those of what we call the tree of paradise."

In view of the evidence of the kind quoted and of various corroborative traditions,† it would appear that tropical America has a good claim to being considered the native home of the silk-cotton tree. Just what the direct evidence may be for Pickering's ‡ unqualified assertion that the tree "by European colonists was carried westward across the Pacific to the Philippines," and also to India and Africa, we have been unable to discover, but the idea seems plausible. Mr. George Watt, in his "Dictionary of the Economic Products of India" § remarks that "No writer definitely affirms that *Eriodendron* is wild; nearly all speak of it as cultivated." If evidence can be found showing the existence of this tree in the East Indies prior to the discovery of America, it will naturally raise some interesting questions of the kind recently discussed by Mr. O. F. Cook,|| who finds grounds for believing that the cocoa palm and several other important food plants of wide distribution in the tropics originated in America

* The editor of the "Historia" states that Las Casas began the writing of it when he was 78 years old, which would be after his return to Spain.

† There is a Cuban tradition to the effect that the first mass on the present site of the city of Havana, in 1519, was celebrated, according to a tablet erected in 1754 in commemoration of the event, under "una frondosa seiba." A photograph of this tablet is reproduced in "El Mundo Illustrado" of November 20, 1904 (p. 310), a copy of which we owe to the courtesy of Professor de la Maza of Havana. The accompanying account in "El Mundo Illustrado" states that the original ceiba was cut down in 1753, was replaced by another which dried out during the building of the commemorative "El Templete" in 1828, but seeded two other trees, one of which still remains.

‡ Chronological History of Plants, 783.

§ 3: 260. 1890.

|| The origin and distribution of the cocoa palm. Contr. U. S. Nat. Herb. **7**: *i–v*, 257–293. 1901.

The American origin of agriculture. Pop. Sci. Monthly **61**: 492–505. O 1902.

and were transported by human agencies to Polynesia, the East Indies, and Africa, in very remote times, or at least in times much antedating the discovery of the New World by the Spaniards.

A MISSISSIPPI ALETRIS AND SOME ASSOCIATED PLANTS

By E. J. Hill

In 1858 I was engaged in teaching at Starkville, Mississippi. Some of the spare hours were given to the study of the plants of the locality. A physician of the place wishing to obtain the colic-root (*Aletris farinosa*), the few books on botany accessible were consulted to ascertain the kind of ground in which it was likely to be found. It was decided to try the pine-barrens west of Starkville. A drive of a few miles through a rich farming region brought us to one in great contrast with it. Crossing a small stream, named in my note-book, Trim-Cane creek, we were abruptly brought into the barrens with their dry, sandy soil and corresponding flora. Only a short time passed before I found a plant which answered the description of an *Aletris*. As there were but two species mentioned in the manuals, *A. farinosa* L. and *A. aurea* Walt., the one discovered, having white flowers, was identified with the former. The leaves at the base of the stems did not agree very well with those described, but being of little experience in the study, I was not as much disturbed by the discrepancy as would have been the case in after years. Having taken a few more plants we returned to Starkville. The time of collecting was May 22, 1858. What use the physician made of the *Aletris* I do not know. A couple of months from that time I returned to New York, not to go back to Mississippi again.

In 1863 I came to Illinois to reside. The place was just south of Chicago, and the first summer in the state revealed the real *A. farinosa* in the sands of the former bed of Lake Michigan. It had radical leaves quite different from the obovate or oblanceolate form in the single example of the Mississippi plant that

had been kept. The southern *Aletris* was therefore left without a name, and might have formed the basis for a new species had it seemed best to found one on a single specimen not much advanced in the floral stage. Sometime after Small's Flora of the Southeastern United States had been published I recalled the *Aletris* and consulted the work to see if such a plant had been described. This I found in the *A. obovata* Nash, whose habitat is similar to that near Starkville: "In pine lands, Jacksonville, Florida." The flowers seem rather more cylindrical than as described in the Florida plant, and appear more like those of *A. farinosa*, but as they are quite young, most of those in the raceme unopened, their full character may not be well developed. In all other respects I see no lack of application in the description, and conclude that *A. obovata* should be looked for in the pine lands of Mississippi.

The names of the other plants collected on the same occasion may be added. All except one, the *Cornus*, which grew by the creek, were associated with the *Aletris*, and are given the same habitat, "Flat pine-barrens, west of Trim-Cane Creek." They are, as named in the botanies of the time: *Gillenia stipulacea* Nutt., *Psoralea eglandulosa* Ell., *Œnothera fruticosa* L., *Cornus stricta* Lam., in low, swampy ground, *Phlox glaberrima* L., *P. aristata* Michx., *Scutellaria integrifolia* L., *Monarda ciliata* L. (now *Blephilia ciliata*), *Pentstemon lævigatus* Soland., *Cirsium virginianum* L.

The *Psoralea* is now placed with *P. pedunculata* (Mill.) Vail. It has no trace of glands, even in bracts and calyx. On the sheet of *P. aristata*, now included with *P. pilosa*, L., are two specimens somewhat different in flowers, one more like the ordinary form of the species, the other with narrower petals and smaller flowers, the lobes of the aristate calyx remarkably long, two or three times the length of the calyx tube, and much curled and twisted when dry. It was doubtless this feature that led to the identification with *C. aristata*. I find that in size of flowers, breadth of segments of corolla, and pubescence or pilosity, plants of *P. pilosa* in this region vary a good deal.

CHICAGO, ILL., October 26, 1906.

SHORTER NOTES.

HIBISCUS OCULIROSEUS Britton. — As there has been some doubt expressed * concerning the specific distinctness of the white-flowered or crimson-eyed swamp mallow and the swamp rose mallow, † an additional record of observations as to the former coming true from seed may not be amiss. ‡

Seed from plants of each species, collected in the autumn of 1905 from plants growing side by side in the herbaceous grounds of the New York Botanical Garden, were sown under glass, germinated, and grew into vigorous plants by the time the weather permitted of their transplanting into the open, where they flowered late this season. These flowers and the resultant capsules showed that each species comes true from seed, that is to say, the progeny of the plant with the clear rose-colored petals, *Hibiscus Moscheutos* L., produced flowers of the same color, which in turn resulted in the corresponding characteristic globose-ovoid, bluntish capsules; likewise, the progeny of *Hibiscus oculiroseus* had white petals with deep crimson bases, followed by the appropriate ovoid-conic long-pointed capsules. There were, however, several plants of the *Hibiscus Moscheutos* seedlings that differed from the species, as they had rose-colored petals with deep-crimson bases and capsules that were intermediate in form, evidently representing a natural hybrid of the two species. It is hoped that these plants will produce fertile seed in another season, the resulting progeny of which should be of considerable interest.

J. A. SHAFER.

NEW YORK BOTANICAL GARDEN.

HOW BRESADOLA BECAME A MYCOLOGIST. § — Abbé G. Bresadola, the distinguished mycologist of Trient, in the Tyrol, was born in the Vâle di Sole and educated at Rovereto and Trient.

* Am. Botanist 7: 37, 95.

† Jour. N. Y. Bot. Garden 4: 219.

‡ Am. Botanist 7: 75. Jour. N. Y. Bot. Garden 4: 220.

§ This story was related by Bresadola himself during a recent visit of the author at his home.

During his school days he had acquired some knowledge of flowering plants, but later decided to study mosses; so he went off to the mountains to make field studies and start a collection of these plants.

In the mountains he fell in with two Capucin monks, who were gathering fungi of various kinds in quantity for the table. They said that an old monk of their order had taught them, from a certain book he had written on the subject, to distinguish the good from the bad, and that they therefore ate a great many species with impunity. Bresadola became much interested, and, forgetting the mosses he had planned to study, began collecting fungi and making notes upon them in the field as the monks dictated.

On returning from the field, however, and looking over the specimens, he found many conflicting statements in his notes, and many species, and even genera and families, thrown together under the same name. When the attention of the monks was called to these discrepancies, they replied that lamellae, pores, spines, etc., were only minor and unimportant distinctions; but they finally agreed, upon his earnest solicitation, to show him their precious volume and let him see for himself how great was his ignorance in these matters. The precious "original" volume proved to be merely a poor synopsis of Venturi's "*Studi Micologici*"; a fact which the monks strenuously denied, even after he brought the true original and showed it to them. They really knew practically nothing about mushrooms, and had by mere luck, on more than one occasion, escaped death from poisoning.

"In this way," said Bresadola, "I became a mycologist, and I have never regretted it."

William A. Murrill.

New York Botanical Garden.

A new Species of Monotropsis. — The mountain region of western North Carolina contains rare plants, some of which have never been described or catalogued. Michaux found the *Shortia galacifolia* in 1788, and after being lost sight of for nearly 100 years it was rediscovered by collectors of medical plants near Marion in 1877.

Some three years ago quantities of a species of a *Monotropsis* which had not been noticed in any flora were found by Miss E. A. Lehman, on the Blue Ridge 17 miles from Elkin, N. C. Miss Lehman consulted various botanical experts, but none had ever seen it; and the general impression appeared to be that it was a late-blooming form of *Monotropsis odorata* or *Schweinitzia*, which was named in the honor of the Salem botanist and mycologist. This could not be correct, for Rev. Lewis D. de Schweinitz's record described the *Schweinitzia* in the following words "very rare — blooming early in February or March, color pink and white, very fragrant like the violet."

Monotropsis Lehmanae sp. nov.

Stems not more than 6–8 cm. high, color brownish-purple with occasional pink, succulent, glabrous; scales several, ovate, more numerous at the base of the scape; flowers odorless, clustered, 6–8, more or less nodding, pinkish and tinged with white; calyx subtended by 2–3 bracts, slightly toothed, upper bract ovate, acute and much larger than the one or two lower ones; sepals oblong-lanceolate, acute, sometimes notched or toothed at the base; corolla saccate, lobes 5-cleft, inflexed, whitish at the base, about one-half the length of the sepals or a little more; stamens 10, filaments glabrous; disk 10–12 crenate; ovary globose, 5-celled; style short; stigma 5-angled.

The plants were found in dark shady rhododendron thickets at Roaring Gap in the Blue Ridge Mountains.

The plant is morphologically different from the sweet pinesap, as the campanulate corolla is but half the length of the sepals, and the lobes are more deeply divided. The color of the plant is different; and the flowers, which are scentless, never appear until about the 20th of September or later. This interesting plant is named in honor of the discoverer, Miss E. A. Lehman, of Winston-Salem, who has furnished notes on the species and deposited specimens in the herbarium of the New York State Museum.

STEWART H. BURNHAM.

ALBANY, N. Y.

A NEW DWARF BLACKBERRY. — This blackberry, which grows at a good altitude, is one of the most interesting and distinct that

I have found, having many of the characteristics of a high blackberry, yet a dwarf. I propose to name it

Rubus abbrevians, sp. nov. Plants with very broad leaflets, large flowers, round stems, numerous weak prickles and moderately glandular-hairy.

New canes. — Stems erect, 1 to 2 feet high, stout, red, eventually terete but somewhat angled at first, without pubescence but with many red-glanded hairs. Prickles numerous, 25 to the inch of stem, slender with weak points, set at random with a slight backward slant, unequal in size, shading to glanded hairs. Leaves about 6 inches long by 5 inches wide, 5-foliolate, dark-green above with a few hairs and slightly lighter and quite pubescent or even velvety below, or on some plants not typical, nearly glabrous. Leaflets very broad, greatly overlapping each other, short-pointed, rather coarsely and sharply serrate-dentate, outline otherwise entire; the middle leaflet nearly orbicular, sometimes slightly cordate, the side ones two-thirds as wide as long, and the basal slightly narrower in proportion. Petiole and petiolules grooved above, without pubescence, the prickles weak, numerous and recurved, glanded hairs stout and abundant; the petiolule of the middle leaflet 0.5 inch long, those of the side ones very short, the basal leaflets sessile.

Old canes. — Erect; prickles and glandular hairs considerably impaired; appearance pyramidal. Growth of second year entirely of leafy branches, one from the axil of each old leaf; these increasing in length from the top downward, 6 to 12 inches long, the lowest often without inflorescence, the others tipped with a short raceme; the axis of each branch zigzag, terete, sparingly glandular and villose, with weak prickles. Leaves resembling those on new canes, similar in color, texture and pubescence, more coarsely serrate-dentate, 3-foliolate approaching 5-foliolate, some 5-foliolate. Leaflets short-pointed, the middle one three-fourths as wide as long, the side ones tending to separate into two leaflets, more or less divided, sometimes parted. Petiole and petiolules grooved above, pubescence coarse, glanded hairs numerous and unequal, prickles weak; the middle leaflet short-stalked, the others sessile. Large, broad unifoliolate leaves at the base of the inflorescence, often tending to be trifoliolate. Inflorescence a short raceme 2 inches long, pubescent and glandular, with 8 to 12 rather short and slender pedicels set at a moderate angle to the axis, subtended by rather large, often leaf-like bracts. Flowers showy with broad petals two-thirds as wide as long; spread of flower 1.25 inches. Fruit

short-cylindric, 0.33 to 0.5 inch long, sweet and abundant; drupelets large and black. Flowers the middle of June, fruit ripe the middle of August.

The only stations yet found are on Stephens Hill (type) in the northern part of Windham, in Windham County, Vermont, at an altitude of about 2,000 feet, and in Grafton, Vermont, in the road from Grafton to Londonderry, one mile west of Houghtonville, at an altitude of 1,500 feet, the stations being about four miles apart.

I discovered the Windham station for this species in 1903, and in 1904 I made a careful study of it, visiting it many times. It covers at least an acre in a rather dry sheep-pasture to the entire exclusion of other blackberries, though scrub spruces threaten to injure it. It is a profuse bearer and the fruit is of a fine flavor. Several times I have eaten my fill of it. Though it was such a distinct plant, yet I was loath to publish it from a single station. But after visiting it again June 22, 1905, I had the good fortune to find it the next day in Grafton. Here it is exactly the same plant, though a little larger, as it grows in a more favorable place and there is good reason to believe that it is not a mere local plant.

William H. Blanchard.

Westminster, Vermont.

REVIEWS

Rydberg's Flora of Colorado*

Not since the "Flora of Montana," by Dr. P. A. Rydberg, appeared in 1900, has anything of comparable importance been issued upon the plants of the interior west. A flora of Colorado is essentially a flora of the Middle Rocky Mountains. The great Centennial State with its exceedingly diversified soils, extreme variation in altitudes, and great extent in latitude and longitude naturally supplies the conditions for a varied and extensive flora. Wyoming, possessing essentially these same characteristics, is equally prolific, the two floras having very much in

* Rydberg, P. A. Flora of Colorado. The Agricultural Experiment Station of the Colorado Agricultural College, Bulletin 100. Pp. i–xxii + 1–448. 1906.

common but differing widely in those plants from the extreme south of the one and the extreme north of the other.

This new flora of Colorado is of so much interest as to warrant a brief history of its origin. During the last decade of the nineteenth century one of the energetic and serious students of the Rocky Mountain plants was Professor C. S. Crandall, of the Agricultural College, at Ft. Collins. During the years of his professorship there he accumulated for the College a very creditable collection of the plants of the state. It was his purpose ultimately to publish, at least an annotated list, but the work was delayed from year to year partly on account of the unsettled state of the nomenclature problem. Finally Professor Crandall was called from the state to take up another line of work. However, since so much work had already been done and since the collection contained so many specimens new to the state and throwing light upon the distribution of the species, the College officers were unwilling to drop the original plan to publish the accumulated results.

The notes, however, were not in shape for publication since Professor Crandall had adhered to the nomenclature of Gray, and the scores of new species, in the copious material at hand, had not been characterized. In casting about for some one to put the notes and the herbarium in shape, this privilege was first offered to the present reviewer, who, for want of time, reluctantly declined what would have been a very pleasant task. Subsequently, appeal was made to the Director of the New York Botanical Garden, through whose kindly consent and encouragement, Dr. P. A. Rydberg was induced to undertake the task. That the preparation of the manuscript could not have fallen into abler hands needs not to be stated, but it is the irony of fate that the work begun by a "conservative" should have been revised and concluded by an "ultra-radical" of the recent school.

We need not concern ourselves here with the vast amount of work that confronted the editor. The volume now before us tells its own story as to that. Nor need we refer to the vexatious delays incident to the printing of so large a technical work with its thousands of citations. The unusual activity both in the

field and in publication has enormously increased the known species during the years since Porter and Coulter's Flora of Colorado (1872) and Coulter's Manual of the Botany of the Rocky Mountain Region (1885) appeared. The work now before us lists 2,900 species, distributed in 700 genera. Though the list is based upon the collection at Ft. Collins, yet many other collections were consulted, and practically all the literature dealing with that field was reviewed.

While the work is not a "manual," it is more than a mere "list." Analytical keys are given throughout, including one to the orders. The species are listed under the scientific name, without description, followed by a list of the localities. The altitude is frequently indicated but collectors and specimens are not cited.

It need scarcely be said that the order of sequence is that of Engler and Prantl, but in the genera recognized there is a considerable departure from that standard work. Whether segregation has yet reached its limit remains to be seen, but *Astragalus* (of the old-time limits) has expanded into 17 genera; *Rubus* into 3; *Gentiana* into 4, and has itself entirely disappeared. Many other segregations might easily be cited. Fortunately, however, the principal recent synonyms follow the many unfamiliar names that appear, making the list comprehensible without search for the original publication. Since the Flora must be of service principally to the trained systematist, it would have facilitated his work if the citation of the binomial used had been given.

It would be an easy matter to take exception to species included, to species excluded, to synonymy indicated, to violations of the law of priority, but the fact that remains is of far greater significance, viz., that a very difficult piece of work has been done remarkably well. The botanical fraternity of the west owes Dr. Rydberg a deep debt of gratitude, and the officers of the Colorado Agricultural College are to be congratulated on the high quality of the work in systematic botany that they are able to place before the public.

AVEN NELSON.

UNIVERSITY OF WYOMING,
LARAMIE.

NEWS ITEMS

Dr. John K. Small, head curator of the herbarium and museums of the New York Botanical Garden, left New York on October 23 for further explorations in the southern end of the peninsula of Florida.

The general arrangements for botanical meetings of the American Association for the Advancement of Science and affiliated societies, to be held in New York, December, 1906, are as follows:

Wednesday, December 26. Afternoon. Meeting of Torrey Botanical Club at New York Botanical Garden.

Evening. Reception to visiting botanists by the Torrey Botanical Club in Schermerhorn Hall, Columbia University.

Thursday, December 27. In Schermerhorn Hall, Columbia University.

a. Council, Botanical Society of America, 9 a. m.

b. Business meeting, Botanical Society of America, 10 a. m.

c. Organization of Section G, 11 a. m., followed immediately by address of the Vice-President.

d. Joint session, Sections F and G, 2 p. m.

e. Evening. Address of the retiring President of the Association, followed by a general reception by the trustees of Columbia University.

Friday, December 28. Morning. Joint session of Sections F and G continued, at Columbia University.

Afternoon. Section G and Botanical Society of America, Columbia University. Sullivant Moss Chapter and other botanical associations at Columbia University.

Saturday, December 29. Morning and afternoon. Meetings of Botanical Society of America at the New York Botanical Garden. In the late afternoon unveiling of busts of distinguished American men of science at the American Museum of Natural History.

Evening. Reception at American Museum of Natural History by the trustees of that institution and by the New York Academy of Sciences.

Monday, December 31. Meetings of Section G and of Botanical Society of America at Schermerhorn Hall, Columbia University.

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TORREYA

December, 1906

SOME HITHERTO UNDESCRIBED OUTCROPS OF ALTAMAHA GRIT AND THEIR VEGETATION

By Roland M. Harper

In my phytogeographical sketch of the Altamaha Grit region of Georgia,* as well as in some earlier papers more accessible to botanists,† I have called attention to the very limited occurrence in the Georgia pine-barrens of outcrops of a kind of rock which is not exactly matched in any adjoining state. These rocks have comparatively little interest for the geologist, being merely a locally indurated phase of a formation of mottled clays and cross-bedded sands which occurs just beneath the superficial Lafayette loam and seems to cover the greater part of the coastal plain from South Carolina to Florida and Mississippi, if not farther; but to the phytogeographer they are extremely significant.

The vegetative covering of any of these rock outcrops can usually be divided into three classes: first, species more common in other habitats in the pine-barren region, which have gained a foothold on the rocks and manage to survive amid uncongenial surroundings because competition is not very severe there; second, species which are common on flat granite or sandstone rocks in the upper districts but are not known elsewhere in the coastal plain; third, a few species not known outside of the Altamaha Grit region of Georgia, which are nearly if not quite confined to these particular rocks.

* Ann. N. Y. Acad. Sci. **17**: 22, 41–44. *pl. 1.* 1906.

† Torreya **4**: 139, 140. 1904; Fern Bull. **13**: 3, 15. 1905. Bull. Torrey Club **32**: 143–145, 152, 166, 168, 170. 1905.

[No. 11, Vol. 6, of Torreya, comprising pages 217–240, was issued November 26, 1906.]

In July, 1906, while spending a few days in South Georgia, I made it a point to visit some of these outcrops of Altamaha Grit which I had heard of in previous years but had never seen; and I was fortunate in adding the names of some species to each of the three classes mentioned above, besides discovering new stations for several plants already known from such habitats.

FIGURE I. Falls on Rocky Creek, Coffee County, viewed from below. July 18, 1906. (This place is popularly known throughout the county as "The Rocks" or "Falling Water.") The rocky slope in the left foreground is practically bare of vegetation, but on the level surface a few yards farther to the left are most of the rock-loving plants mentioned herein. The trees in the background are mostly *Pinus palustris*.

In the northern part of Coffee County, about nine miles northeast of Broxton, the nearest town of any size, a small creek, known appropriately as Rocky Creek, breaks through a horizontal stratum of Altamaha Grit, tumbles eight or ten feet into a pool, then flows away through a winding gorge 50 to 75 feet wide with perpendicular or overhanging walls. These walls are intersected in places by straight vertical fissures—some of them

wide enough to walk through — where large masses of rock have become detached from the main ledge. In these gloomy crevices, the walls of which are moist in many places from dripping water, are numerous bryophytes (mostly common species) and a few ferns, much as in the "rock-houses" of northern Alabama, described by Dr. Mohr.* In fact the whole appearance of the place, barring its surroundings of open pine-barrens, is much like that of some places in the sandstone plateaus of Alabama with which I had recently become acquainted, and this similarity extends also to the flora, there being not a few species in common.

Down in the gorge the vegetation is very similar to that of river-bluffs in the same region,† while on the broad exposed horizontal ledges on either side were the usual plants of such places, including *Senecio tomentosus*, *Chondrophora virgata*, *Pentstemon dissectus*, *Ilysanthes refracta*, *Crotonopsis*, *Talinum*, and *Selaginella acanthonota* (or a closely related form ‡), which I had not found in Coffee County before. In addition to these, *Stenophyllus capillaris* on the flat rocks was new to the flora of the Altamaha Grit region, and *Cheilanthes lanosa*, on the cliffs, had never been seen in the coastal plain before. *Epidendrum conopseum* in full bloom on the cliffs was another surprise, for I had never before found it on anything but a smooth-barked tree, and rarely on any other tree than *Magnolia grandiflora*, none of which was in sight at this place.

The occurrence of *Cheilanthes lanosa* here furnishes an interesting problem in distribution. The nearest other stations known for it are on granite rocks over 100 miles away, § and there is little likelihood that there is another such place in South Georgia, so one is compelled to believe that its spores have traveled a hundred miles in one leap. Some of the other plants having a similarly disjointed distribution may possibly have grown in many places in the sandy pine-barrens for a time after the region last emerged from the sea and when competition was not so severe

* Contr. U. S. Nat. Herb. **6**: 75, 76. 1901.

† See Ann. N. Y. Acad. Sci. **17**: 102–106. 1906.

‡ See Bull. Torrey Club **32**: 152. 1905; Ann. N. Y. Acad. Sci. **17**: 309. 1906.

§ See Fern Bull. **13**: 10. 1905; where it is called *C. vestita*.

as at present, but it is inconceivable that the *Cheilanthes* ever did so.

In May of this year I received from Mr. S. W. McCallie, assistant state geologist of Georgia, some specimens of *Diamorpha pusilla* collected on a flat outcrop of this rock in the southeastern part of Washington County, and on July 20th I sought out and found the locality, with most gratifying results. In open pine-barrens between the stations of Peacocks and Harrison I found one flat rock covering about an acre, as well as several smaller ones, all of which strikingly resembled some of the flat granite rocks around Athens, Stone Mountain, and other places in Middle Georgia.* No projecting ledges or cliffs were seen at these places, and the rock stratum is probably pretty thin.

On these flat rocks were observed *Senecio tomentosus*, *Marshallia ramosa*, *Aster squarrosus*, *Chondrophora virgata*, *Ilysanthes refracta*, *Trachelospermum difforme*, *Crotonopsis linearis*, *Arenaria brevifolia*, *Talinum teretifolium*, *Allium Cuthbertii*, *Rynchospora cymosa* and *Selaginella acanthonota*, each of which was already known from one or more localities in the Altamaha Grit region, but had not been seen in Washington County before.† I found also at the same places *Sericocarpus linifolius* and *Acerates floridana*, new to the Altamaha Grit region but not to the coastal plain, *Kneiffia* sp. and *Diamorpha pusilla*, new to the coastal plain, and a species of *Cuscuta*, probably new to science. Unlike all other known species of *Cuscuta*, this one grew exclusively on one of the most characteristic plants of such situations, *Chondrophora virgata*, which of course (as it has been seen by so few botanists) has never had any such parasite reported from it before. The *Cuscuta* was quite plentiful, but I could not find a trace of it on any other host.

A little later in the day I saw a similar rock outcrop just out-

* For an excellent illustration of such a flat granite area see Bull. Geol. Surv. Ga. **9A**: *pl. 17. f. 1.* 1902.

† For a summary of the previously known distribution of these species within the region, see the catalogue of species (pages 132–322) in my phytogeographical sketch. Notes on the occurrence of some of them in the mountains of Alabama were published in TORREYA for June, 1906, and there is a note on *Trachelospermum* in Bull. Torrey Club **33**: 535. 1906.

side of Wrightsville, but being on a moving train at the time I was able to recognize only two species there, *Talinum* and *Selaginella acanthonota*, both of which were new to Johnson County. I have no doubt, however, that *Chondrophora virgata* and several of the other species above mentioned can be found there also.

The fact that the Washington County rock areas are within 30 miles of the fall-line suggests a route by which some of the rock-loving plants may have entered the coastal plain. At the time of preparing my description of the region I had no definite knowledge of the occurrence of this rock so far inland, and did not allow for it on the map. This must be about its extreme inland limit, however, for along the Central R. R., which crosses the county a few miles farther inland, there seems to be no rock of this kind, nor even any pine-barrens. The locality described is just about on the divide between the Ogeechee and Oconee rivers, so it has not been eroded as much as the country a little east and west of it.

The topography of this extreme northern edge of the Altamaha Grit region is not exactly typical, and it seems likely that the more homogeneous lower phase of the formation, which is exposed along the rivers farther south * and perhaps determines the typical topography which has been described elsewhere,† is wanting here, allowing the underlying Oligocene or Eocene rocks to approach the surface. More field work is needed for the determination of this point. An interesting and perhaps correlated fact is that this seems to be the only part of the Altamaha Grit region which is outside of the range of *Pinus Elliottii*, the inland limit of which passes through Johnson County a few miles southeast of Wrightsville.

Up to the present time I have seen unmistakable outcrops of the Altamaha Grit in the counties of Jenkins,‡§ Washington, Johnson, Tattnall, Toombs, ‡ Laurens, § Dodge, Jeff Davis, ‡§ Coffee, Wilcox, Crisp,‡ and Turner, ‡§ and have been reliably in-

* See Ann. N. Y. Acad. Sci. **17** : 22. 1906 ; Torreya **6** : 199. 1906.

† Bull. Torrey Club **32** : 146. 1905 ; Ann. N. Y. Acad. Sci. **17** : 23. 1906.

‡ These five counties are among those created in 1905 and therefore do not yet appear on most maps.

§ In these counties I have seen the rocks only from trains and have not been able to make any notes on their vegetation.

formed of its occurrence in Emanuel, Irwin, Ware, and Colquitt. I am still of the opinion, however, that the aggregate area of all these outcrops will not exceed one square mile or one hundredth of one per cent. of the area of the typical Altamaha Grit region, as I estimated last year. *

College Point, N. Y.

LEAF-RAFTS AND FOSSIL LEAVES

By Edward W. Berry

In these modern days, with the dredging of our rivers and estuaries, the draining of our marshes and the ever-widening dumps of refuse that haunt the outskirts of our growing cities, it would seem almost as if the old-time methods by which the vegetation of bygone geological ages was preserved had become a thing of the past, and that the localities where the leaves of the present flora would stand a chance of preservation and fossilization had been usurped by the ever-spreading "white man's burden." Nevertheless, in many a more remote region, leaves, fruits and seeds are being stored away with a prodigality rivaling that of the Mid-Cretaceous or of the European Oligocene.

We are doubtless familiar with accounts of the vast rafts of vegetation which the Amazon and other tropical rivers bring down to the sea; however, these are largely driftwood like the famous Atchafalaya raft in the Mississippi, which by rough computation contained 295 million cubic feet of material and required the intervention of the state for its removal. Similar instances in more temperate climes are rarer, at least so runs the record, and I do not recall any published observations on the leaf-rafts which may be seen on the rivers of our southern coastal plain. These rafts are sometimes of comparatively large size, especially during spring freshets, at which time it is not uncommon to see them from ten to fifteen feet in diameter.

The rivers where they have been observed by the writer are the

* See Torreya **5**: 114. 1905; Science II. **21**: 920. 1905; **23**: 486. 1906.

Roanoke in North Carolina and the Great Pee Dee in South Carolina, although I have no doubt that other rivers under suitable conditions would furnish equally good examples. These conditions seem to be that there shall be a variable water content so that the autumnal fall of leaves will have a chance to form a thick carpet on the low mud-banks or exposed sand-bars of the

FIGURE 2. A stranded leaf-raft, Great Pee Dee River, South Carolina.

meandering stream, where they accumulate for weeks. With the return of high water the following spring or possibly not until summer, although the largest rafts are to be seen in the spring, they float away seaward. They are remarkably uniform in their character and contain but few sticks or foreign matter, the bulk of the material consisting of the matted leaves of the sycamore (*Platanus*), elm (*Ulmus*), birch (*Betula*), and the willow and chestnut oaks, with a considerable admixture of other species, including the more rapidly decaying leaves of the sweet gum and other trees that haunt the river banks.

These rafts furnish a most perfect illustration of one of the

ways in which leaves sometimes become fossilized, and carry us back to the fossil leaf-beds which are so common in the Cretaceous of the coastal plain. The foregoing rivers carry much sediment, especially during periods of high water, so that when the raft finally becomes waterlogged and sinks in some quiet place or is stranded on the sand-bars of some river cove like the one in the center of the illustration, the river mud soon covers it and we have an incipient clay bank with abundant leaf impressions and layers of lignified leaves several inches in thickness. The flood plains of these rivers, both ancient and modern, abound in such leaf beds going back to the Pleistocene, if, indeed, it be possible to draw the line and say where the Pleistocene ended and the recent deposits began. The leaves do not help us greatly in this respect, for deposits of undoubted Pleistocene leaves are practically all of species still existing, although in some cases they may be of species not common to the region at the present time, or the deposits may lack some of the common riverside forms of the present.

Unfortunately, good photographs were not secured of any of these leaf-rafts in midstream, and the accompanying illustration from a photograph taken on the Great Pee Dee river shows a stranded raft which was about fifteen feet long and whose true nature was carefully verified. It was still floating so that if the background be eliminated a good idea is gained of the appearance of these rafts.

This is, of course, only one of the many methods by which leaf remains are stored away. The many swamps along the lower reaches of these same rivers abound in beds of vegetable material often many feet in thickness, and doubtless represent in a general way the method of formation of the lignitic material in such formations as the Montana and Laramie, as well as furnishing us with a picture of the physical conditions and elevation of the land during that period when the Mississippi gulf finally retreated from the great interior region of the United States. They also serve admirably to refute the now antiquated notion that peat is formed only in high latitudes.

Baltimore, Md.

A RARE UROMYCES

By John L. Sheldon

Repeated efforts were made during the spring of 1906 to find the teleutospore stage of the rust producing *Aecidium houstoniatum* Schw. on *Houstonia coerulea* L. Although a number of species of rusts were found near the infected plants of *Houstonia*, their aecidial stages are known to occur on other hosts, with the exception of a *Uromyces* found on *Sisyrinchium graminoides* Bick. Whether this particular *Uromyces* on *Sisyrinchium* has an aecidial stage is probably not known, and whether it has one on *Houstonia* has not been definitely determined.

Observations made in the field showed that the *Uromyces* developed after the *Aecidium* had begun to mature and distribute its spores. After the uredospores on *Sisyrinchium* had developed, other plants of *Sisyrinchium* near by were infected both naturally and by placing pieces of the infected leaves over plants that had not previously shown the rust.

Five clumps of *Houstonia*, with aecidia on them, were transplanted beside plants of *Sisyrinchium* in localities where the *Uromyces* had not been seen and where there were no plants of *Houstonia* growing. After about ten days to two weeks, depending upon the atmospheric conditions, uredosori began to develop on the Sisyrinchiums. Of course, there is a possibility that they may have been infected from spores from some other source, but the transplanting was done as carefully as possible. One can never be certain that his fingers and clothing do not have spores upon them, but future inoculations under control may prove that the *Aecidium* of *Houstonia* and the *Uromyces* of this *Sisyrinchium* are stages of the same rust. Both hosts have been transplanted from the field to the greenhouse, and an attempt will be made to secure the different stages of the rust by inoculation, both on mature plants and seedlings.

The *Uromyces* on the *Sisyrinchium* is evidently very rare, at least in this form. It differs from the description of *Uromyces Sisyrinchii* Mont. in having uredospores, in the shape of the

teleutospores, in that the teleutospores germinate at maturity in the living host, and the epispore of the teleutospores is smooth. Dr. J. C. Arthur, to whom specimens were sent, seems to think that it may be the same as an unpublished species occurring in Maine, and named by Mr. P. L. Ricker.

The rust is so little known that it has been considered worth while to describe it, even though it may be the same as the one named by Ricker, in order that those who are interested in this group of fungi may be on the look-out for it during the spring and summer of 1907. The following description has been prepared from freshly collected material. The color of the sori is much darker on dried specimens of *Sisyrinchium*.

Uredosori. — Spots yellow or none. Sori single or in rows, amphigenous, pulverulent, orange-yellow, surrounded by the ruptured epidermis, elliptical to linear; uredospores orange-yellow, broadly ovate to subspherical, echinulate, $11.5–13\,\mu \times 8–10\,\mu$.

Teleutosori. — Single or in rows, amphigenous, pulvinate, orange, becoming brown, somewhat gelatinous; teleutospores accompanying or following the uredospores, which they resemble in color, elliptical to oblong, apex tapered and thickened, base narrowed, $16–19\,\mu \times 8–9\,\mu$, epispore and pedicel subhyaline; pedicel much longer that the spore, up to $50\,\mu$; teleutospores germinating in the living host.

Occurring on *Sisyrinchium graminoides* Bick. at Morgantown, West Virginia.

West Virginia Agricultural Experiment Station,
Morgantown, W. Va.,
November 1, 1906.

REVIEWS.

Postelsia, The Year Book of the Minnesota Seaside Station.*

This is in reality volume 2 of a series of papers under the name *Postelsia*, the first volume of which appeared in 1902. But, unfortunately, the convenient form of citation "Postelsia **2**:" or "Postelsia, vol. 2" can not be used with technical accuracy in referring to the present work, as no volume number is to be

* 8vo. Pp. 1–347 + Index. *pl. 1–33*. St. Paul, Minnesota, 1906. Price $2.25.

found on title-page, cover, or folio-headings, and it is only from the "Word of Introduction" by Professor Conway MacMillan and from an advertising circular that one may infer that no "Year Book" was published in 1903, 1904, and 1905, and that the present volume constitutes the second of the series. This volume, like the earlier, contains seven essays, the first of which is by C. O. Rosendahl and is entitled "Observations on Plant Distribution in Renfrew District of Vancouver Island." The rainfall at Port Renfrew in 1902 was 300 cm. and the author estimates that 275 cm. may not be far from the yearly average, indicating that "the place is one of the rainiest in temperate North America." The great amount of rain, combined with the mildness of the winters, induces a luxuriant vegetation and one of much biological interest. The plant associations are first discussed under three general heads: I. Marine formations; II. Formations of the beach; III. Formations of the forest country; then follows a list, including 18 species of Pteridophyta, 10 species of Gymnospermae and 222 species of Angiospermae (79 monocotyledons and 143 dicotyledons). The author summarizes the main conclusions drawn from the study as follows: (*a*) "That the pteridophytic flora is poor in number of species for a region showing almost tropical conditions as regards moisture, yet shows great density and profusion;" (*b*) "That the gymnospermous flora forms the all-important group and constitutes the great mass of the island vegetation"; (*c*) "That of the two classes of angiosperms the monocotyledons occupy a more important position than the dicotyledons. * * * In conclusion, it can be said in general that the flora of Vancouver Island, in so far as it can be judged by observations confined to a limited area of the same, is typically boreal, with an admixture of more arctic forms than the latitude, the elevation above sea-level, and present climatic conditions would indicate." Some errors in writing or proof-reading, such as "*Plantago macrocarpum*, "*Stachys ciliatus*," "*Monotropa hypopytis*," and "*Boschniakia strobilaceae*," and certain peculiarities in bibliographic citation detract a little from the literary merits of Dr. Rosendahl's interesting paper.

The second essay is on "The Conifers of Vancouver Island"

and is written by Fred K. Butters. It is based on observations made in the dense coniferous forests of that region during four summers spent in the vicinity of the Minnesota Seaside Station. Thirteen species of conifers are known to occur spontaneously on the island, none of them being endemic. The author discusses their distribution and associations, and adds technical descriptions of families, genera, and species, and keys to the genera. A peculiarity of the taxonomy is that the genus *Abies* is taken in the broad ancient sense of Tournefort and Adanson and includes the *Picea*, *Tsuga*, and *Pseudotsuga* of nearly all modern writers. The relationships of these groups are so complicated that their recognition as genera is considered unsatisfactory.

The third paper is by Alexander W. Evans and is on the "Hepaticae of Vancouver Island." The first Hepaticae known from the island appear to have been those collected by Dr. David Lyall in 1858 and 1859. Later, important collections were made at three different times by Professor John Macoun and smaller ones by Dr. G. W. Dawson, Professor William Trelease, and Mr. J. M. Macoun, and in the summers of 1901, 1902, and 1903, further collections were secured in the vicinity of the Seaside Station at Port Renfrew by Miss Gertrude Gibbs, Mr. S. A. Skinner, and Miss Daisy Hone, respectively. These last-named collections were studied by Professor Evans and included two species elsewhere described as new under the names *Odontoschisma Gibbsiae* and *Scapania americana*. The list which the author now gives embraces seventy-one species, this being an increase of fourteen over the number recognized for Vancouver Island in Macoun's "Catalogue of Canadian Plants," after making allowances for some necessary revisions in Macoun's list.

The fourth paper of the series is on "Some Western Helvellineae," by D. S. Hone. This is based on specimens collected in the western United States and Canada during various expeditions to the Minnesota Seaside Station. Seven species are mentioned and described, representing the genera *Spathularia*, *Mitrula*, *Cudonia*, *Rhizinia*, *Helvella*, and *Gyromitra*, none of the species being regarded as new.

" *Renfrewia parvula*, a new Kelp from Vancouver Island," by Robert F. Griggs, is the title of the fifth paper. The proposed new genus *Renfrewia* is distinguished from *Laminaria* by its simple discoid holdfast without hapteres, from *Cymathere* in its unfolded lamina, and from *Phyllaria* in the absence of cryptostomata. The type-species, *Renfrewia parvula*, is considered to be one of the most primitive of kelps. Two previously described species, *Laminaria solidungula* J. Ag. and *Laminaria yezzoensis* Miyabé, are referred to the new genus.

" A Study of Tide-pools on the West Coast of Vancouver Island," by Isabel Henkel, the sixth essay, is written chiefly from the standpoint of dynamic geology, with some reference to the plant and animal life of the different types of pools and the conditions affecting the existence of life in such places.

The volume closes with a paper by Professor C. W. Hall on " Some Geological Features of the Minnesota Seaside Station," in which the geological formations of Port Renfrew and vicinity are described. The prevailing rock in the neighborhood of the Station is a hard dark shale, but mountains of granite occur west of Port Renfrew Bay. There are evidences of local glaciation but scarcely any that the region, as a whole, has been covered by a general ice-sheet.

The present volume of *Postelsia*, like its predecessor, is printed on wide-margined, enameled paper, and is illustrated by numerous half-tones from good photographs. It will not only form a pleasant souvenir to those who know the Vancouver coast and the Minnesota Seaside Station, but is also a dignified contribution to American botanical literature. MARSHALL A. HOWE.

PROCEEDINGS OF THE CLUB

OCTOBER 9, 1906

The first regular fall meeting of the club was announced to be held at the American Museum of Natural History, at 8:15 p. m. The day and evening were stormy, and only four members were present. The meeting was not called to order.

C. STUART GAGER,
Secretary.

OCTOBER 31, 1906

The second stated fall meeting of the club was held at the museum building of the New York Botanical Garden at 3:30 p. m. In the absence of the President, Professor H. M. Richards presided. Twenty-three persons were in attendance.

The reading and adoption of the minutes of the meeting for May 23 and for October 9, 1906 was followed by the nomination of the following persons for membership: Mr. Charles M. Bergstresser, 58 West 47th St., New York City; Miss Edith B. Brainerd, 55 Van Buren St., Brooklyn, N. Y.; Douglas Houghton Campbell, Stanford University, Calif.; Mrs. H. A. De Costa, 58 Diamond St., Little Falls, N. Y.; F. W. Foxworthy, Bureau of Science, Manila, P. I.; Dr. Joseph V. Haberer, 11 Jewett Place, Utica, N. Y.; Mrs. Erick E. Lehsten, Grand Ave., Grantwood, N. J.; Mr. Bayard Long, Ashbourne, Pa.; Miss Annie Lorenz, 96 Garden St., Hartford, Conn.; Miss Rosalie Schumacher, Millington, N. J.; Mrs. Reuben H. Underhill, 19 S. Elliot Place, Brooklyn, N. Y.; Professor Ivan E. Wallin, Kenilworth, N. J.

The resignation of Miss Anna M. Clark was read and accepted.

Dr. Britton presented the matter of the Club's action in connection with the meeting of the A. A. A. S., to be held in New York City, December 27–31. The program of meetings for the Association week was read, and motion was made that a committee of five, including the chairman of the meeting, be appointed by the Chair, with power, to arrange for a reception to visiting botanists in Schermerhorn Hall, Columbia University, on the evening of December 26th. The motion was carried. The personnel of the committee is as follows: Professor H. M. Richards, Professor L. M. Underwood, Dr. H. H. Rusby, Mrs. E. G. Britton, Dr. C. Stuart Gager.

Dr. Britton presented the following amendment to the constitution of the Club:

"To amend Article XIV. of the constitution relating to annual dues, so that it shall read as follows:

"Each active member, upon his election, and annually at the beginning of each fiscal year thereafter, shall pay to the treasurer

the sum of five dollars. The payment of these annual dues shall entitle each active member to receive all publications of the club issued during the year."

The following papers were presented:

"Remarks on the Formation of aërial Tubers in *Solanum tuberosum*," by Dr. C. Stuart Gager.

A brief outline was first given of the steps in the germination of the potato seed, up to and including the growth of the primary rhizomes, and the formation at their distal ends of the first tubers. Reference was then made to two recent publications in TORREYA (**6**: 181, 211. 1906), describing an anomalous formation of a tuber of *Solanum tuberosum*, on a sprout from a seed tuber, in daylight, and briefly summarizing the pertinent literature.

The specimen in question, with photograph, was then exhibited, and possible causes of the anomaly discussed. Prunet's researches (Rev. Gén. de Bot. **5**: 49. 1893) led him to the conclusion that, at maturity, the apical and basal ends of the mature tuber are physiologically different, due to a redistribution, after the cessation of growth, of the reserve materials stored in the tuber while it was forming. The validity of this conclusion has never been tested by other investigators, and it was thought improbable that such a condition, even if it existed in the seed tuber which bore the anomaly, would enter as a causative factor.

The specimen exhibited, and numerous other recorded cases of the formation of tubers on aërial branches, render very improbable the suggestion of Noël Bernard (Rev. Gén. de Bot. **14**: 139, 269. 1902), and of Jumelle (Rev. Gén. de Bot. **17**: 49. 1905), that potato tubers are caused by a fungus, a species of *Fusarium*, endotrophic with *S. tuberosum*.

In the normal formation of tubers two kinds of factors are doubtless involved: the first organic, consisting of specific peculiarities in the protoplasts; the second environmental, comprising external conditions, especially of light and moisture, and the stimulus of the various metabolic products within the stem. The ability to induce tuberization in aërial stems by depriving them of light and reducing their transpiration, as Vöchting did, and the sport described by Vilmorin (see TORREYA, *l. c.*), suggest

that the specific cellular peculiarities obtain throughout the entire shoot system, and need only the stimulus of definite environmental conditions, either external or internal, to make them operative.

In this connection it would be desirable to know whether the presence, in any portion of the potato stem, of a superabundance of food materials would operate as a stimulus, causing the excessive formation of parenchymatous xylem cells, which, gorged with the reserve food, make up the greater part of the bulk of the tubers. It is well known, through the researches of Knight and others, that, if the flow of food materials is diverted from incipient underground tubers by removing them as fast as they begin to form, this material will accumulate in portions of the aërial stem, causing tubers there. In the specimen in question, translocation of digested food became established toward and into the developing "sprouts," but elongation of the latter was not favored because of the very slight water supply from without. It does not seem improbable that a combination of these two conditions alone would be sufficient to produce the tuber, even in daylight.

"Two new coralline Algae from Culebra, Porto Rico," by Dr. Marshall A. Howe.

Dr. Howe exhibited and discussed briefly specimens representing two rather large and conspicuous kinds of non-articulated corallines which were secured during a visit made last March to the island of Culebra. These have been studied in collaboration with Dr. M. Foslie, of Trondhjem, Norway, and a joint paper, in which the two new species are to be described and illustrated, is soon to be published. One of the species is a *Goniolithon* which seems to have its closest affinity among the forms already described in a species originally found on the island of Funafuti, of the Ellice Islands group, in the South Pacific. The second species, a *Lithophyllum* which forms columnar flat-topped masses sometimes a foot in height, is evidently a reef-builder at Culebra, and like the other, curiously enough, finds its nearest relative in a species originally described from Funafuti and since reported from the Maldives in the Indian Ocean. The speaker remarked

upon some of the general characteristics of the non-articulated corallines, and showed microtome sections and photomicrographs illustrating the structure of the two species that were under discussion. In reply to a question as to the ecological relationships of the coralline algae and the true corals, it was stated that though certain species of both groups are reef-builders and inhabit similar places, each of the groups seems to be somewhat inimical to the other. A place in which corals are flourishing is not a good place in which to look for coralline algae, and *vice versa.* It is a common thing to find corallines attached to dead or moribund corals, but comparatively rare to find the corals growing on calcareous algae. In one case a crustaceous coralline was noticed to be encroaching upon and covering a living coral.

"Remarks on the Flora of Nova Scotia," by Dr. C. B. Robinson.

The province of Nova Scotia consists of a peninsula connected with New Brunswick by an isthmus of very slight elevation, and the island of Cape Breton separated from the rest of the province by the Strait of Canso, which at the narrowest place is less than a mile broad. The northern part of the island is composed of hills between 800 and 1,400 feet high, except narrow strips along the coast and in the river valleys.

In general, the flora of the peninsula and island is composed of plants which have migrated from the west or southwest through New Brunswick, many species having their northeastern limit in the province. A second source lies in the introduction chiefly from Europe, of weeds in ballast, etc., and many species thus added to the flora are very conspicuous and troublesome. But the main purpose of the paper was to call attention to the presence in northern Cape Breton of a third element, namely, species that are believed not to occur anywhere upon the peninsular portion of the province, and in some cases not in New Brunswick. Such cases are always open to the suspicion of incomplete collection, but this can hardly be held to explain the gap in the distribution of the male fern, *Dryopteris Filix-mas* (L.) Schott, known from about twenty localities in this region, although nowhere abundant there, and not found otherwise east

of Vermont. Another conspicuous fern reported from two rather widely separated districts in northern Cape Breton is the holly fern, *Polystichum Lonchitis* (L.) Roth, and no other stations are recorded east of Ontario. A similar statement may be made about many flowering plants, those referred to being *Carex abacta* Bailey, *Blephariglottis Blephariglottis* (Willd.) Rydb., *Sanguisorba canadensis* L., *Aster nemoralis* Ait., not known from peninsular Nova Scotia, *Drosera intermedia* Hayne and *Solidago macrophylla* Pursh, only so far found there immediately east of the Strait of Canso.

It was attempted to correlate this with the observations of Canadian geologists to the effect that the region in question had escaped glaciation, the limit of the ice-sheet being not far from Pictou.

Specimens were shown also of several species not hitherto recorded from the province, among them *Tetragonanthus deflexus* (J. E. Smith) Kuntze, *Sparganium fluctuans* (Morong) Robinson, *Meibomia canadensis* (L.) Kuntze, *Vicia hirsuta* (L.) Koch, *Falcata comosa* (L.) Kuntze, *Chaenorrhinum minus* (L.) Lange, and *Triglochin palustris* L.

"Account of a Collecting Trip to the Sierra Maestra of Cuba," by Mr. Norman Taylor.

Before giving an account of the various trips made during the expedition, a description was given of the area visited. This was a tract about forty miles long, having for its southern limit the Caribbean Sea. Its northern boundary is the ridge of the Sierra Maestra range. At its eastern and lower end this range is about 3,500 feet high, but rises in altitude, and gradually approaches the coast as it goes to the westward, reaching its culminating point near El Turquino, a mountain credited with an elevation of 8,400 feet. There is no gradual descent from the ridge of the Maestra to the sea, but numerous other mountains intervene. This feature, together with the river valleys, makes the country very rugged and precipitous.

The chief rivers, the Sevilla, Guama, Bayamita and Paladeros, rise in the Maestra itself, while numerous others of uncertain local names rise in the front ranges. All the rivers, at this time

of the year, flow under the ground for the last two miles, so that it is easily possible to get across near the coast, but in the rainy season they flow in the surface bed and are quite impassable.

The prevailing wind is the moisture-laden northeast trade. On this account the rainfall is abundant on the windward side of the Maestra while the leeward side of the range is dry and arid. The increasing altitude of the mountains from east to west and the decrease in the width of the strip of land lying between them and the sea makes the effect of this great wind-shield still more marked as one travels westward. Here at least two species of *Cereus*, and an *Agave*, together with many other more or less xerophytic plants, were found.

Among the interesting plants collected were specimens of *Pinus occidentalis*. This pine occurred on the mountains at elevations between 1,000 and 2,300 feet, and was plentiful in many places. The great size and inaccessibility of the trees of *Ceiba pentandra* that were found in the mountains were cited as facts that must have some bearing on the probable New World origin of the species.

Discussion followed by Dr. Britton and Dr. Howe, the former giving recent evidence collected by him in Jamaica, pointing toward the conclusion that the *Ceiba* may very probably be considered as a native of the New World.

The meeting adjourned at 5:20 o'clock.

C. Stuart Gager,
Secretary.

NEWS ITEMS

Science for November 16 announces the appointment of Dr. Albert Mann, formerly professor of botany in the Ohio Wesleyan University and expert in the U. S. Department of Agriculture, as professsor of botany in the George Washington University.

The herbarium of William Mitten, the distinguished bryologist, who died at Hurstpierpont, England, last July, has been purchased by the New York Botanical Garden. Mr. R. S. Williams, of the Garden staff, sailed for England on October 6 to superin-

tend the packing and shipment of this important collection, returning to New York November 29. The Mitten herbarium is rich in Hepaticae as well as in Musci.

Mayor McClellan has appointed Dr. Arthur Hollick, of the New York Botanical Garden staff, a member of the Board of Education of Greater New York to succeed Mr. Samuel M. Dix, of the Borough of Richmond.

A recent number of *Science* states that Dr. E. B. Copeland, who for the past three years has been engaged in botanical and educational work in the Philippine Islands, has been elected horticulturist of the West Virginia Agricultural Experiment Station and was expected to begin his new duties about the middle of November.

The Torrey Botanical Club will give a reception to the visiting botanists of the American Association for the Advancement of Science in Schermerhorn Hall, Columbia University, on the evening of Wednesday, December 26. The regular meeting of the Club, announced in the November TORREYA for the afternoon of that day, will be omitted.

Mr. T. S. Brandegee, recently of San Diego, California, the donation of whose herbarium to the University of California was announced in the October TORREYA, has been appointed honorary curator of the herbarium of that institution. The Brandegee herbarium is said to consist of over 100,000 sheets of plants, mostly representative of the Mexican flora, and to include an especially strong collection of the North American Boraginaceae.

Dr. Roland M. Harper is now engaged at the American Museum of Natural History in some special work in connection with the Jesup collection of woods. His doctorate thesis, "A Phytogeographical Sketch of the Altamaha Grit Region of the Coastal Plain of Georgia," which forms Part 1 of Vol. 17 of the Annals of the New York Academy of Sciences and comprises 414 pages, with 28 half-tone plates and a map, was issued in November.

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New names and the names of new genera and species are printed in boldface type.